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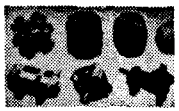

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THE ANCIENT GODDESS

Editorial by John W. Campbell

It has been recognized, since the most ancient times, that the ruler of luck is a Goddess—female, fickle, unpredictable, whimsical, and capable of cruelty and favor with equal irrationality.

NASA has just been experiencing the left-handed blessings of Lady Luck, and, simultaneously, the warm and winning smiles of The Lady. And anybody who tries to sell a NASA scientist on the fact that this world is run entirely by purely rational and simply predictable Laws —that Lady Luck doesn't live in space as well as on Earth—is going to have trouble putting over his point.

Atlas-Agena vehicle combinations are among the most reliable, dependable devices men have yet developed for space exploration. That's why the Atlas-Agena combination was picked for the space-rendezvous and docking maneuvers programmed for the Gemini 9 flight.

So when one after another of their Agena space-docking targets had flubbed, gone wild, and generally misbehaved—they gave up and sent up a gadget originally intended more for use as a mock-up than as a docking target—the ADTA.

That they succeeded in getting into orbit.

Then Gemini 9 was all ready for launch, countdown reached one minute, forty seconds before takeoff . . . and stopped. The computer in the first-stage booster had decided it knew all it needed to know, and wasn't interested in the latest data on where its target vehicle was. Three times they tried to up-date its data—while the five minutes of the launch-window slipped by.

By this time Astronauts Stafford and Cernan had been up and down on that launch-tower elevator so many times they must have been about ready to rename the project Yo-Yo 9 instead of Gemini 9. Stafford claimed he had more launch-pad time than any man in space-flight history.

The problem of the computer that couldn't digest its data turned out to involve two logic modules; it was fairly simple to plug in a couple of

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replacement units in time for the retry two days later.

Again the two astronauts suited up, rode up in the tower elevator, crawled into the Gemini capsule . . . and waited.

This time Gemini 9 got a perfect launch, went into the assigned orbit perfectly, and successfully caught up with its target—which turned out to be the henceforth-and-forevermore famed "Angry Alligator". The two half-shell epoxy-fiberglass shroud shields hadn't detached from the target vehicle as per specifications. Moreover, they refused to detach—and made any docking tests impossible.

Since that shroud device was designed to stand up to plowing its way through the atmosphere at a couple thousand miles per hour, it had had to be tough—a 300-pound structure of epoxy-fiberglass can be far tougher and stronger than an equally massive structure of aluminum or stainless steel—it's nothing to fool around with when you're in a fragile shell of titanium skeleton and beryllium "shingles"—and the only habitable volume of space you can possibly reach.

So they had to give up on the docking, and go on to the space-walk tests.

And that, of course, didn't come off quite right either. Oh, most of it was pretty successful—but the test of the individual astronaut backpack maneuvering unit was a complete bust, because the communication system didn't work properly, and something seemed to be wrong with the oxygen supply system.

Perhaps at this point it was best that Cernan's communication came through only as a grunting gargle; he would have had reason for non-broadcastable comments on the nature and antecedents of Lady Luck.

Gemini 9 was the thirteenth manned space capsule. Thirteen things went wrong.

Now intermeshed with this whole fiasco was another space-research project—Surveyor I was launched before the Angry Alligator was, and was in flight on its way to the Moon while Gemini 9's computer hiccuped and spit back the up-dated data. It was cruising on toward Luna while Stafford and Cernan had to crawl out of that capsule again, and go back down on the elevator.

While Cape Kennedy and the Houston Manned Space Center were sweating out the problem of *why* the blasted contraption had refused to accept the data—the Jet Propulsion Laboratory, and the Goldstone Tracking Center out in California were sweating out the landing of Surveyor I, 238,000 miles away.

Surveyor had taken off only three years behind schedule; the Planning Department of NASA somehow seemed to have got its foot in its mouth, its fist stuck in its ears, and its mind in a dense California smog. The Surveyor program had demon-

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strated one of the high points in fouled up bureaucracy of all time. If any program deserved to achieve a complete and total bust for Ingrained Confusion—Surveyor was It.

On the other hand . . . maybe the bureaucrats were so busy crossing each other up they were too busy to interfere with what the engineers on the job were doing?

In any case, Surveyor I got off to a perfect launch shortly before the Angry Alligator went into orbit, and headed for the Moon on exactly the calculated orbit.

There was one slight—and extremely worrisome—hitch; Surveyor had two extensible antennas, which were to erect themselves once the machine got out into space, beyond atmosphere resistance. One of the two did; the other didn't extend itself properly. Since the two were each capable of handling the full load of radio communications, electronically this was no problem. But from the viewpoint of the laws of mechanics it could be disastrous.

The problem is equivalent to that of the ice skater who's doing one of those fancy pirouettes. She extends her arms, and kicks herself into a spin on one toe, then draws her arms into her sides; conservation of angular momentum then makes her spin three to five times as fast because of the drastically reduced radius of rotation.

Surveyor's radio antenna that was *not* extended did *not* have the same angular momentum the one that was extended did—nor did it have the angular momentum their calculations were based on. Moreover, the center of gravity was *not* where they'd designed it to be. What would Surveyor do when they called for its mid-course maneuver—and when the powerful thrust of the soft-landing retrorocket cut in? Tip? Wobble? Go into a tumbling spin?

The only thing they could do was go ahead and hope.

The midcourse maneuver was ordered—and Surveyor responded with perfect precision. It oriented itself properly on the Sun and Canopus and Earth, turned precisely the number of degrees ordered, yawed precisely as commanded, and thrust with exactly the required force for the computed time.

It was about 1:45 a.m. Eastern Daylight Time when the Moment of Truth for Surveyor I really began; the orders for the soft landing on Luna began to go out from the great Goldstone Tracking facility. The roll, yaw, and roll maneuvers necessary to align Surveyor's thrust-axis with the Moon were made with perfection. The altitude sensing radar was activated—the flight-mode control circuits were activated. As each command went out from Goldstone at the speed of light, Surveyor faithfully reported back the computer-language equivalent of, "Roger; command received and executed," two and two-thirds seconds later. (*continued on page 175*)

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STRANGERS TO PARADISE

It was, by official act of legislature, "Paradise"; they named it that. Any resemblance to a mythical abode came a lot closer to Hell, however!

CHRISTOPHER ANVIL

Illustrated by John Schoenherr

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Vaughan Nathan Roberts, captain of the fast interstellar transport *Orion,* stood in the huge room admidst all the wheeled and antennaed metal shapes, large and small, and thought of his ship orbiting the planet with its drive knocked out. The idea of coming to this place, he told himself stubbornly, was to get repairs. Not to get eaten alive, mobbed, or bundled around by roboid functionaries, but to get repairs. The question was, how?

Roberts was flanked by metal boxes nearly as tall as himself, much wider and thicker, with whip antennas on top, bicycle wheels below, and the words "Law Enforcement" blazoned on them front and back.

Directly in front of Roberts stood a far larger metal box, on low massive wheels, with a variety of antennas sticking up, and mouthpieces, viewscreens, and receptor heads thrust out toward him under the glowing letters: "CRIMINAL COURT."

From this maze of screens and speakers, a voice was murmuring, ". . . Fingerprints, palm prints, retinal patterns, total body index: not on record. Conclusion unavoidable that this individual is not native to this planet."

"I've been trying to tell you," said Roberts, "we had gravitor trouble. We headed for the nearest repair facility, got here crippled, couldn't raise any response on the communicator, and half-a-dozen of us came down in the ship's tender. The tender cracked up in a forest forty miles from the spaceport. Three of my men were badly hurt. One of us stayed with them, and two of us hiked out for help. When we reached your city, here, we got garbage dumped on us, tin cans and chunks of cement slung at us, a gang of kids went for us, and then your iron gendarmes arrested us for causing a riot."

"Unsuitable attire," snapped a voice from the metal box to Roberts' right.

"We are dressed as spacemen," said Roberts shortly. "Now, I've got three injured men in the tender, and a ship in orbit with the rest of my crew trapped on board. We'll gladly pay for medical help and repairs. *Where are they?"*

A general murmur and clack rose from the big metal box in front of Roberts. On the screens, human faces and metal forms of various sizes and shapes rapidly came and went. From somewhere in the room, Roberts could hear the voice of Hammell, his cargo-control officer, raised in anger.

Then a speaker in front of him was murmuring, "On basis of correlation of statements of both accused, overall probability of guilt is 0.2, necessity of making examples 0.1. Therefore, adjudge innocent, transfer to Immigration."

At once, a loud voice announced, "We find the accused *innocent* of all charges brought against him."

From Roberts' captors, to either

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side, came low murmurs of discontent.

A new voice spoke with authority. "The prisoner will be released at once, and escorted to Immigration for disposal."

Roberts blinked. "I don't want to immigrate. I just need repairs for my ship!"

The words "CRIMINAL COURT" faded out and the words "IMMIGRATION HEARING" flickered on.

"Name," said the box.

Roberts said, "I've been *through* all that. What I want . . ."

"*Name,*" said the box sternly.

To Roberts' right, one of the smaller boxes explained, "You *were* at the Criminal Court. Now you are at the Immigration Hearing."

"I don't *want* to immigrate!" said Roberts.

The big metal box said sternly, "This case has been transferred to Immigration for disposal. Relevant information of interest to applicant: 1) No individual not already a citizen. 2) Due to food and material shortages, technological breakdowns, and attendant malfunctions, no one, not a citizen, will be fed, sheltered, clothed, or otherwise allowed to become a charge on the planet, until otherwise decided by the due and constituted authorities." There was a brief pause. "Name."

Roberts blinked. Apparently he would have to become a citizen in order to exist while arranging for repairs.

"*Name,*" snapped the box.

"Roberts. Vaughan N. Roberts."

"Sex."

"Male."

"Age."

"Thirty-six."

"Height."

"Six feet one-quarter inch."

"Weight."

"One hundred seventy-five pounds. Look . . ."

"Occupation?"

"Spaceship captain. Listen, all I want . . ."

"Inapplicable occupation. Demand for spaceship captains this planet: zero. Correction: Occupation: Unskilled. Years of experience?"

Roberts stared. "Experience? As a spaceship captain?"

"As unskilled," snapped the box. "This is your occupation."

Roberts said, "I have no experience as unskilled. I . . ."

"No experience," said the box disapprovingly. "Any physical defects?"

"No. Look, all . . ."

"Convicted of how many crimes the last three years?"

"None. I . . ."

"Formal education?"

Roberts blew out his breath. "Twelve years of general schooling, six years training in the Space Academy, one year at the Tactical Combat Command Advanced Training Center. *And all I want is to get some repairs done!*"

"Seven years college training.

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Equivalent fourteen years experience credit. Excellent. Raise your right hand."

Roberts exasperatedly raised his right hand.

"Repeat after me," said the box, and rolled off words in short incomplete groups, so that Roberts had time to repeat the words, but not to understand their full meaning. Then the box said, "You are now a citizen of the planet Boschock III, known as Paradise, and entitled to all the rights and privileges appertaining thereto, and subject to all the laws, regulations, and customs, thereof, so help you God, Amen. This hearing is closed."

The words "IMMIGRATION HEARING" faded out.

Before Roberts could say a word, he was rushed up a gravity-lift, down a hall, and shoved into a room where he was weighed, measured, photographed, fingerprinted, palm, toe, and footprinted, retinagraphed, his mouth pried open and teeth examined, and then he was presented with an identification card, and run down the hall to a window where ration books popped out slots onto a counter. Next he was hurried out to a store full of huge vending machines, and outfitted with a new set of clothes.

Roberts and Hammell now found themselves outside, holding their own clothing wrapped in big bundles, and each wearing a kind of loose long-sleeved blouse, loose long pantaloons, ill-fitting shoes, and long-billed high-topped floppy cap.

Roberts looked sourly up the street at the milling crowd, then glanced at Hammell. "Do *you* have any ideas?"

"I wouldn't know an idea if one banged into me," growled Hammell. "I'm so mad I can't see straight."

"We need to get in touch with someone in authority—if any human on this planet *has* authority."

"Yes," said Hammell. "But how?"

Roberts said, "If they have any kind of public communications system here, there ought to be a directory."

While they were trying to think where to look for one, a large mobile metal box stopped in front of them, and abruptly shot its antenna to full height. Metal covers on its sides snapped back and a dazzling yellow light flashed in their faces. A set of long flexible metal arms whipped out, a mesh-covered speaker snapped "Spot check," and with a quick flip of the metal arms, the robot emptied their pockets onto the sidewalk. Next, it rapidly felt them all over, then jerked loose the bundles they were holding, so that they spilled open in the street.

"Nonexplosive. Clothing. But nonstandard. *You have receipts for these?*"

For the moment, Roberts was speechless. He heard Hammell snarl, "They're our own clothes."

"Uncitylike behavior, one count: lying to roboid police officer under direct interrogation during spot

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check; these are not clothes permissible for a citizen to wear, hence they are not *your* clothes. They can only be *costumes*, and costumes can only be purchased by registered entertainers. You are not dressed as registered entertainers." The yellow light flashed in Roberts' face. *"You.* You have receipts for these? Your answer? *Do not lie."*

"We're new citizens," Roberts began, "and—"

"Not asked. Do not evade the question. *Do you have receipts for these costumes?"*

"Of *course,"* said Roberts. "Yes, *certainly."*

"Produce the receipts."

"They're on board the spaceship *Orion.* We wore these clothes on board *Orion,* came down to arrange for repairs, got sent to Immigration, and then bought the clothes we're wearing now. These clothes in the bundles are the clothes we wore when we came down."

"Spaceship visits are rare, improbable. It follows, this explanation is improbable. *Arrest on suspicion of shoplifting.* You will come with me for immediate interrogation while investigation proceeds."

The two men were separated, placed under bright lights for a long series of questions, then put into a cell with two cots, a light bulb, a toilet, a 3-V set that didn't work, and a decorative design on the ceiling that obviously incorporated the pick-up heads for a sight-and-sound recording system.

As the robot-jailer rolled off down the corridor, Roberts and Hammell eyed the ceiling, and lay down on the cots without a word.

Several hours crawled by, then a tall gray-haired man wearing dark-blue blouse and pantaloons, of good material and narrow cut, walked down the corridor, and stopped outside the cell.

"Which of you is Roberts, Vaughan N.?"

"I am."

"You represent yourself as a spaceship captain?"

"I'm captain of T. S. M. *Orion,* Interstellar Rapid Transport Corporation. The ship is now orbiting this planet with a nonfunctional main gravitor. I came down here to arrange for repairs, but our tender went out of control, we cracked up, two of us hiked in to get help, were attacked by a gang, arrested, dragged into court, given to understand we would immigrate or starve to death, then arrested because we couldn't produce receipts for the clothes we'd worn down, and here we are."

"I see. And this other individual . . . let's see . . . *Hammell?"*

"He's the cargo-control officer assigned to *Orion."*

"As which," said Hammell coldly, "it is my duty to tell you that *Orion* has a spoilable cargo. This planet is supposed to have a Class II commercial repair facility. We've been trying to get in touch with it for days."

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"I see. My name is Kelty. I'm assistant-chief of the Law-Enforcement Department, acting under the planetary computer, which technically is chief. I'm afraid I have some bad news for you gentlemen."

"Not surprising," growled Hammell.

Roberts said, "This planet has been nothing but bad news since we got here."

"Then why not go to another planet?"

"Our gravitor burned out. We had to strip the coils of the tender's gravitor, to make emergency repairs. Then, to come down here, we had to scavenge from the main gravitor, to get the tender to work."

"Where did you land?"

"We didn't land. We crashed, about ten miles inside a forest belt, between a couple of wide tracts of cleared land. The spaceport was about forty miles to the east of where we crashed."

"Then," said Kelty, watching Roberts alertly, "you were well inside the killer forest. I'm surprised you got through alive."

"Yes," said Roberts, "we're a little surprised, ourselves. We'd scarcely started to set foot outside the tender when a thing like an oversize gray tiger jumped us. We fought that off with guns from the emergency kit. Our communications officer got in contact with your city here—we hadn't been able to raise it while we were in orbit—and while I was trying to arrange for help, another of these overgrown tigers showed up. Meanwhile, it turned out that I was talking to a mechanical answering device of some kind, so I gave that up. We fought off this second animal, the sun set, and something started taking cracks at the far side of the tender. This thing forced its way into the tender's cargo-compartment. We managed to get in touch with someone else on the communicator, but before we could make our position clear, the tender got heaved around, and the communicator was smashed."

Roberts shook his head. "The next morning, Hammell and I started through the forest, got into some kind of a thicket that folded big clinging leaves around us like wet sheets, and while we were fighting clear of this, a pile of insects came pouring through the trees, tumbling over each other, and spreading out to eat everything in sight. We managed to get out of their way, and saw that when the horde passed, all the insects left behind jumped and flew after it to catch up and pour forward again. They were traveling southeast, which suited us, so we walked along close behind, and believe me, nothing bothered us. When they hit the cleared ground, they changed direction, and we got out of the forest and hiked the rest of the way in the open."

Kelty was listening intently. His look of suspicion had disappeared, and now he smiled. "You used your

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heads. Such good sense deserves success; but I'm sorry to have to tell you, we have no way to go in after those men, and the repair facility you're looking for is no longer here."

Roberts looked at him blankly.

Kelty said, "You've apparently assumed that the population of this planet grew up from a beginning with a few tough settlers to its present size. In that case, if there was cause for a repair facility in the first place, it wouldn't disappear overnight. But it isn't so. This city was designed and built as a man-made paradise, through the beneficence of a tax-free foundation. The foundation was under legislative investigation. To get out from under, an accumulated surplus balance of several trillions had to be unloaded quickly, and it had to be done somehow for the demonstrable benefit of mankind. A planetary-utopia project was dug out of the files, and right here is the final result. This city was built, and staffed by highly-trained technicians, with a computer in overall control, then the foundation opened a campaign on half-a-dozen overpopulated worlds, gathered from their slums millions of 'socially-disadvantaged individuals' and used the last of its excess money shipping them here. *That* is how this planet was settled."

Roberts grappled with the mental picture this created.

Hammell said, "Where did a repair facility *ever* fit in?"

"It looked nice in the plans, and it did a good job when the populace was coming in here. After that, there wasn't much use for it. When a mob looted and burned it, the computer had what still remained reprocessed to fill more urgent needs. There's nothing left now but a plot of ground where the facility used to be."

Hammell shook his head, and glanced at Roberts.

Roberts finally said, "There's no way to get the repairs done here?"

"Not without the equipment and the technicians. The equipment was looted. About that time, the technicians saw the way things were sliding, and made recommendations, which the computer, in compliance with its built-in directives, rejected. The technicians got fed up. One fine morning, they pulled out, leaving the computer programmed to neither produce nor maintain air-travel mechanisms. The technicians went to the far side of the killer forest, and set up independent farming communities over there. This planet being what it is, they're evidently having plenty of trouble, but they prefer it to the city. We can't reach them to bring them back. We have no air transport. And the computer couldn't be programmed to restore the repair facility except by these technicians."

Roberts said, "Could these technicians be persuaded to come back temporarily, just to program the computer?"

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Kelty's eyes glinted. "If so, they'll never get away again. They broke their contract. Now the whole roboid police is on the lookout for them. Naturally, I will obey the orders of the planetary computer, and seize them the instant they show up." Kelty saw Roberts' expression, and smiled. "Don't worry, Roberts. They know this. No, you could never possibly persuade them to come back here. We've tried to hire people to take their place, but without success. Who wants to spend his time struggling with the frustrations of a gigantic slum-city? Everything you do here fails. Put up a light bulb, and someone will smash it. Install a water pipe in the afternoon, and it will be ripped out by next morning. Bare maintenance is all the computer and its mechanisms can manage. For most specialists, the work is solid frustration. My job is a little different. It's quite a challenge to use limited force in such a way that a measure of order is maintained. But I do it, and I aim to continue to do it."

Roberts thought it over. "I can see what you're up against. But unless we can get the computer and the technicians together, how can we get the ship—or even the ship's tender—repaired?"

Kelty shook his head. "In the present setup, it's impossible. The computer can't divert the effort to rebuild the repair facility, because of the widespread disorder and destructiveness of the populace."

"I can't leave my ship in orbit," said Roberts "and the men trapped on board, helpless."

"But, you see, unless some order can be brought out of this chaos, we have no choice in the matter. And to do that would take a change in the attitude of the populace. There's only one other way."

"What's that?"

Kelty studied him speculatively. "*If* you and your men, who have considerable technical background, will first consent to devote your time and training exclusively to work for the City, from now on, *then* we might be able to work something out." He straightened up, and then stepped back. "Then, you see, it might be worth the computer's while to rebuild the repair facility."

Roberts stared at him.

Kelty smiled. "Meanwhile, since you are citizens, you have guaranteed rent-free cost-free housing. If you should decide to join us, your work would naturally require that you live in close proximity to the Planetary Control Center. Until you do, it would, of course, be unfair to discriminate against the other citizens by giving you special attention. Since we've found you innocent, you will now be released. You'll be given a routing ticket on the way out, to take you to your quarters. You'll find them airy, with an exceptional view."

Kelty turned, gestured, and a roboid-jailer wheeled with a hiss of tires down the corridor.

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Kelty gave them a final smiling glance. "Think over what I've said, Roberts. If you decide to join us, let me know."

That evening found Roberts and Hammell in a five-room apartment on the sixth floor of a ten-story building. The building had emergency staircases littered with cans, broken bottles, garbage, and large rats, which disputed the passage with them on the way up. The gravitor-drop had a chain across the entrance, bearing a dented "NO POWER" sign. There was not a whole piece of glass to be seen in the building. The empty window frames looked out over a park, where dead half-grown trees had four-letter words carved in their bark, and the spindly grass sprouted amidst heaps of rotting garbage.

From down in the streets came a scrape and rumble as battered cleaning-machines picked up trash. From the building above came a chorus of yells:

"*Kill* the lousy mechs!"

A fusillade of bottles smashed down on the machines' armored tops. Loudspeakers broadcast appeals for law-abiding cooperation, and the air shook with curses flung back in answer.

Roberts and Hammell stared out the window at the buildings and parks, laid out like the alternating squares of a checkerboard, and stretching off to the horizon. In the distance, lit by the setting sun, the buildings looked almost magical. Nearby, rats scurried amidst the trash in the park. From overhead, a bundle of garbage plummeted past the window, opening up as it fell.

Hammell turned away from the window. "*Now* what do we do?"

"The first thing is to get out of here. Kelty seems to think a little experience of this will make us eager to join him. I wouldn't want to stay in this place on *any* terms."

"The forest is murderous. The City won't help. That leaves the technicians."

Roberts nodded. "If we can get them to help, maybe we can straighten the mess out yet."

"If they haven't *already* helped, it's too bad for Matthis, Warner, and Cassetti."

Roberts nodded soberly. The three men had been too badly hurt in the crash to carry out. "Well, if we get out of here early in the morning, we should avoid getting waylaid by a gang. I hope we can find where we cached our packs, guns, and canteens. Then we can start back."

"Personally, I'm half-dead from the last hike."

"If we stay here, we could be all-dead before we know it."

Hammell glanced around. "There's truth in that, all right. Well, while it's still light, let's get set. This could be a rough night."

The two men blocked the door with a battered bedstead and a bureau with all the knobs broken off its drawers, then cleaned out a small

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room and collected in it all the bottles they found in the litter, just in case they should need ammunition. They carried the wreck of a mattress into this one room, stuffed the baseboard's ratholes with smashed glass and the bent lids of tin cans, and jammed another can into the hole where the corner of the door was gnawed away.

The night started out like a bad dream. The mattress was lumpy, the room damp, and the garbage smell overpowering. Toward morning, someone began to scream, and someone else began to laugh hysterically. The louder the screams rose, the louder was the laughter.

Roberts came dizzily awake to find the room faintly lit by a reflected glow from below, where powerful street lamps stood protected by big metal shields and heavy wire mesh. From the walls came a twang of metal as the rats wrestled with the tin shoved into their holes. From the door came a scrape that Roberts interpreted as a rat trying to move the can jammed between the door frame and the gnawed corner. Then the scrape came again, louder, and Roberts sat up. He reached out carefully, and closed his hand around the neck of a heavy bottle.

Wide-awake now, he could see that Hammell was out of bed, but he couldn't see where he was. Carefully, Roberts got up.

From the doorway, came a louder, longer scrape.

Slowly, the door swung open.

From the darkness of the next room, a stooped figure eased in, the faint light glinting on the edge of a broken bottle in its hand.

From behind the door came a brief glint of reflected light. There was the rap of glass striking bone. The intruder dropped. There was a crash and the sound of splintering glass.

A long moment passed, and nothing else happened.

Hammell stepped out from behind the door, glanced toward Roberts, and waited a moment. The screams and laughter overhead rose to a peak, then died away.

Hammell said, "How much rest are we going to get in this place?"

"You're right." Roberts felt carefully along the floor. "Here, help me turn the mattress over on top of the broken glass. All we need is a cut foot."

They gathered their bundles of clothing, carefully checked to be sure they had everything, and eased out into the next room. Around them, there was the scurry of feet, as rats went across the floor. Then they found the door, eased out into the pitch-black hall, and a low voice spoke, close to Roberts:

"You get their ears?"

Roberts shifted his bottle, landed a solid blow, heard something thump to the floor, and groped forward toward the steps. As he pulled open the door, something ran across his foot. He eased onto the steps, and

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started down. The slow descent to street level seemed to take all eternity. Then they reached the lower hall, found the front door, and eased it open.

Outside, the street was brightly lit.

A roboid policeman, whip antenna up, rolled past with a silvery flash from its swiftly-turning wheels.

Roberts waited, then carefully pulled the door wider. The policeman was a dwindling speck in the distance. Roberts and Hammell slipped out, walked quickly down the block, and turned left, toward the west and open fields.

Up under one of the streetlights, a loudspeaker blared:

"Halt, thieves! You are detected on the central board! *Mobile police units are already on the way.* You cannot escape!"

"Run!" said Roberts.

From overhead, someone shouted happily, "Hunt! A hunt!"

Roberts and Hammell ran, hampered by the bundles they were carrying. Overhead, fresh loudspeakers blared . There was the sound of banging, shouting, and a concerted rush to the windows. Screams of "Hunt! *There they go!"* rang out. A bottle crashed into the street just behind. The next bottle hit to the right and in front, scattering broken glass over the street. "Thieves! Thieves! *Kill* them. Look out! *Here come the mechs!"* There was a pause, then a loud jeering, and a deafening rattle and smash further back.

Urgently, the loudspeakers boomed, "You must cooperate! Do not obstruct the law-enforcement officers!"

Straight ahead, the brightly-lighted street abruptly came to an end, a garbage-filled park on one side, and a high building on the other side. From this building, streaks of light flashed down, the reflections from hurtling bottles, as Roberts and Hammell sprinted past.

"Look out!" screamed someone overhead. "You're headed Out!"

Roberts and Hammell shot over an embankment in a headlong rush, heard a squeal of rats as they plunged knee-deep in a mass of garbage, then slammed forward on their bundles. As they pulled free, they glanced back, to see the police robots, bottles bursting and splintering in a dazzle of light from their metal tops and sides.

Roberts and Hammell stumbled across the dump, fell forward on soft earth, and looked back to see the robots spreading out along the edge of the embankment. But they didn't go down the steep bank, where they might overturn or mire down in the piles of garbage.

The loudspeakers blared, "You have left the City! Before you is only bare ground and the killer forest!"

The hail of bottles had let up. Voices shouted from the buildings, "You're Out! *You can't live out there!"*

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"Come back!" shouted fresh voices.

"Return!" blared the loudspeakers. "Here you have Universal Care. Out there is only the Wild."

Roberts glanced at Hammell. "You hurt?"

"No. By some miracle, I didn't step on any glass."

"Neither did I. Let's get further away from this place."

By daybreak, the voices and lights had long since faded into the distance. In the gray light of dawn, they located the cache, changed to their own clothes, checked their guns, slung their packs, and headed toward the forest. At an irrigation ditch, they stopped to drink, refilled the canteens, and munched emergency-ration bars from their packs. Then they went on.

Late that afternoon, the forest came into sight far ahead, barely visible across a flat field with endless rows of small, geometrically-spaced plants.

"Better stop here," said Roberts.

Hammell nodded. "We don't want to hit that forest at night."

Worn out, they lay down in the soft earth, to fall asleep at once, and wake early the next morning, stiff, chilled, miserable, and dumbfounded that the night had somehow passed already.

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Today they had the forest to get through.

By noon, they found themselves looking across a wide dry ditch at the mingled trees and shrubs of the forest. The forest edge ran in an almost mathematically straight line, north and south.

"Now," said Roberts, "we can't just walk into that mess. We've got to find the cleared path we came out on. Is it to the north or south?"

Hammell looked around. "Why didn't we follow our own footprints back?"

Roberts glanced back. In the enormous field, the only irregular feature was their fresh footprints in the soft soil.

Roberts said, "There weren't any footprints near the cache. Whatever cultivates this field must have wiped out the prints."

They turned back to the forest.

"Well," said Hammell, "which way?"

Roberts looked around thoughtfully. "South."

"South it is."

For the next hour-and-a-half, they trudged south, and had just decided to go back north when, in the distance ahead, they saw the open end of the angling track through the forest.

Simultaneously, they saw, far away and straight ahead, a low cloud of dust.

Out of this, there resolved a low broad frame, straddling the rows at the edge of the field, with the angled wing thrust out into the wide ditch. The frame was rushing toward them at high speed, suspended above the earth on antigravs, with the low cloud of dust rising behind it.

Hastily they looked around, took half-a-dozen steps toward the center of the field, then saw another dust cloud coming fast behind the first one, and behind that, still another cloud of dust.

They whirled, looked back.

Already, the frame loomed larger. It was coming fast.

Roberts plunged toward the broad, dry ditch, rushed across the bottom of it with Hammell close behind, and scrambled up the far bank. A roaring hiss was now audible, and growing louder fast. Breathing hard, Roberts forced himself up the last of the slope into a patch of brush at the forest edge.

The brush gave way before them. An instant later, the cultivator roared past.

Wind swept over them, and they looked out through a whirling cloud of dust. "That was close!"

"Sure was. But—"

Suddenly, Roberts grabbed for his sheath knife.

All around them, the brush was unfolding large leathery leaves that swung up to blot out earth and sky. At a touch, they wrapped themselves around Roberts and Hammell, and clung tighter with every movement.

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Roberts barely had time to reach his knife. As the leaves wrapped around him, his arms were pinned to his sides down to the elbow. The clinging velvety surface drew snug across his face, tight against his nostrils, and shut out the air. Only from the waist down was he free. He turned, felt a stem draw tight, like a stretched cord, reached out with the knife, and cut it. With his free lower left arm, he tore at the big leaf across his face. At once, fresh leaves wrapped snugly around his arm and chest, pinning the arm. He sucked in desperately, bit through the leaf as it pressed into his mouth, then dragged in a breath of air that stopped as abruptly as a slammed door when a new leaf wrapped around his face.

Roberts struggled to concentrate on that sharp knife held in his right hand. He turned slowly, cutting away each stalk as it grew taut. Carefully, he stayed in the same spot, lest he bring himself within reach of fresh leaves. Meanwhile, his need for breath was growing. Already, his chest was straining in a spasmodic effort to draw in air. He cut and turned, cut and turned, then strained desperately to free his left arm. The clinging leaves, slashed loose at the base, reluctantly pulled free, and for an instant, all he could do was drag in great gasps of air.

Hammell, working the same way, managed to free himself a moment later. The two men stood breathing deeply, then cut their way out through the few remaining leaves.

"That's the *eighth* time," said Hammell heavily, "that this planet has almost killed us."

Roberts looked around. "I know. I've had nightmares I liked better than this." Behind them, clouds of dust were blowing into the forest. Atop the bank, the thicket folded its leaves, and the stalks pulled together tightly, to give the appearance of a place only sparsely overgrown and easily crossed. As the last big leaves folded out of sight, the rib cage of a large animal came into view, white and smoothly polished, just a few short steps from the edge of the clearing.

Hammell grunted. "There, but for the Grace of—"

"Don't talk too soon. We've still got the forest to get through, and the ship to find."

"That's right."

They found the straight wide path cut by the insects, and holding their guns warily at the ready, they started into the forest. Stretching out in front of them was a path of devastation that stretched as far as they could see. There was no blade of grass, no tiniest small plant in sight in front of them, but only an occasional tree, stripped leafless and bare. They walked through an eerie silence between clumps of thick vegetation to right and left, but nothing bothered them. Nothing came near, save a small mouselike creature that blundered onto the path, looked in both directions, gave a desperate squeak, and vanished back into the

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undergrowth with desperate kicks of its hind legs.

After four hours, they found where the horde of insects had first poured into view. In another hour, they found the clearing, and near one side of the clearing, the wrecked tender. The large flattened metal spheroid on its three stubby legs looked like home. They shouted, and a tall lean individual with sandy hair and electric-blue eyes looked out. This was Morrissey, the communications man.

Morrissey beamed and waved as they ran over.

Roberts called, "How are Cassetti and the others?"

"Those technicians we got in touch with the first night dropped down in a gray-skimmer and picked them up. They've got doctors and medicines, and think everything will be all right. But believe me, that bunch was all business. If we hadn't had anything to trade, it would have been no go."

"Could they offer any help getting anybody down from *Orion?*"

Morrissey's smile faded. "They said they didn't have the equipment. They said the City has the equipment, and they'll fight to the death before they go back to the City. What's wrong with the City?"

Roberts and Hammell described their experiences, and Morrissey shook his head in disgust. "Then, the brains to do the repairs are on one side of this forest, the equipment is on the other side, and never the twain shall meet?"

"That's it," said Roberts exasperatedly.

"How do we get around that?"

"I don't know."

Morrissey shook his head. "In time, we'll have a ship full of corpses orbiting the planet."

Hammell said, "Even if we somehow fix the tender, and get everybody down here, *then,* where are we? We never wanted to get marooned on this planet. The idea of coming here was just to get some repairs done."

Roberts nodded. "Maybe if we could talk to those technicians some more, we could work out something. Have you got the communicator working?"

Morrissey gave an odd laugh. "It's *working,* all right. But it doesn't *communicate.*"

Roberts frowned. "What *does* it do?"

"Come on inside," said Morrissey, "maybe you can settle a problem that's been bothering me. The question is, whether or not I've gone nuts."

The communicator's case had been removed, exposing the works, and Morrissey pointed out a timer unit between the set and the power supply.

"I put that timer in there when I started work. I wanted to check the hatches again, and be sure everything was secure before nightfall. I

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knew if I just started work, I'd forget everything else, so I set the timer to cut off the current and give a long loud ring."

Roberts and Hammell nodded.

Morrissey said, "I got working on this, and saw after a few minutes that it would be no great problem to fix it—just a matter of a few connections that had jarred loose when the set was knocked to the deck. I thought what a sloppy system it was to use these pluggable connections, instead of permanent connections that couldn't come loose. Then I thought that this *was* quick and convenient, though, and handy when you wanted to hook something up temporarily. Then it occurred to me I had plenty of time, and nothing to do, and for the first time in a long time I *could* just fool around if I wanted to. Well, I was visualizing the circuit, and the action of the different parts, and suddenly I wondered what would happen if I fed the current to an interface that's ordinarily left unconnected in this kind of circuit. I made a few adjustments, so I wouldn't wreck anything, and then I tried it. The next thing I knew, the timer went off."

Roberts and Hammell looked blank.

Morrissey paused.

Roberts said, "What of it?"

"I'd fallen asleep. I figured I must just have been more tired than I'd realized. I checked the ship, and came back, still curious about this circuit. I reset the timer, and switched on the set. The next thing I knew, the timer was going off again, and this time I was picking myself up off the deck. Again I'd fallen asleep. This began to seem peculiar. I checked the ship, came back, cut the current to the interface way down, set the timer for ten minutes, and switched on the set. Right away, I wanted to go to sleep. I wanted the worst way to sink deep asleep, sound asleep—and then the timer was going off and I came awake again."

Hammell stared at the circuit.

Roberts frowned. "What did you do then?"

"I cut the current to the interface to the barest trickle. I reset the timer, snapped on the circuit—and yawned. I didn't exactly feel *tired,* but I wanted to go to sleep. Something seemed to be telling me that I wanted to go to sleep. I fought it off till the timer went off, then the feeling that I wanted to go to sleep faded away, and I just sat there in a cold sweat."

"And," said Roberts, "you're wondering whether it really happened or you imagined it?"

Morrissey nodded. "That's it."

"Let's try it."

Morrissey bent eagerly over the timer. There was the snap of a switch.

Roberts yawned.

Hammell put his hand to his head, swayed against the nearest bulkhead, massaged his eyes and forehead.

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It came to Roberts that he had walked miles and miles today, and miles and miles yesterday, and no wonder he was tired. He was worn out. What he needed, what he wanted, was a long, quiet sleep.

Hammell was already stretching out on the deck.

Morrissey was fighting off a yawn.

Roberts turned toward the tender's control room, and its soft comfortable pilot's chair. But it looked a long way away. He didn't want to go all that distance. He wanted sleep *now*, not after a long hike. He wanted to sleep long and deep, and he took a step into the control room, and then felt the soft cozy deck drifting up toward him as he slipped off into warm sleep, and swirling darkness and sleep.

Something was shaking him violently.

Roberts dizzily opened his eyes. The swirling scene steadied. There was a big face looking down on him, that resolved into Morrissey's face, the electric-blue eyes worried.

"Sir, I'm sorry. I never realized it would hit you so hard."

Roberts remembered the circuit, and pulled himself to his feet.

"Don't blame yourself. Hammell and I were worn out." Roberts' head was throbbing where he'd banged the deck, but that was a minor matter. "You've got a new discovery here. This could be important."

Hammell was bent over the circuit, his expression awed.

Morrissey said, "If only this had happened some other time, instead of down here, with hardly any equipment to work with."

Roberts looked down at the circuit. "You were able to vary the *current* to the interface. Are there *other* circuit characteristics you can vary?"

"Sure. Until I had witnesses, I was afraid to try it. But let me just mark this, so I know roughly where I was—" Morrissey bent briefly over a variable condenser, straightened, said, "I'd better set the timer for a shorter interval, just in case." Then he twirled a knob, snapped on the set, and—

Roberts felt jolted. He looked at Morrissey angrily.

Morrissey glanced at Hammell, still bent over the set.

"Give me a little room, will you?" snapped Morrissey.

Hammell straightened up. "I'll give you all the room you want."

Roberts became aware of an intolerable lapse in discipline. He said shortly, "Drop it. Both of you."

"Sir," snarled Hammell, "this juice-jockey is trying to shove me around."

Morrissey's eyes flashed. " *'Juice jockey'?*" He cocked his fist.

Somewhere inside of Roberts, there seemed to be a little figure, jumping up and down, crying, "What's happening?"

Aloud, Roberts said with grating emphasis, "That's *enough!* Morrissey!"

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Hammel eyed Morrissey's cocked fist. He clenched his own fists.

Roberts glared at them. He would like to smash them *both* in the teeth.

The timer went off.

Roberts' ill-temper evaporated.

Hammell and Morrissey stared at each other foolishly.

Morrissey lowered his fist.

Hammell suddenly laughed, and said, "What have we got here, anyway?"

Morrissey got out a small notebook, and began writing in it. "That's what *I'd* like to know. Let's try something else."

Excited now, and more than a little scared, they tried setting after setting, with the current low and the timer set for less than a minute.

For less then a minute, Roberts looked at Morrissey and Hammell, and despite a fierce struggle to control himself, he wanted to blow their brains out.

Then the timer went off. Morrissey whistled, and tried another setting.

Roberts realized suddenly that his life had been a failure. He wanted money. With enough money, what couldn't a man do? Stacks of crisp green bills seemed to float tauntingly before him. In his mind's eye, he could see piles of gold and platinum bars and soft leather bags of diamonds. He wanted *money*. He *had* to have money. He—

Morrissey changed the setting.

Roberts felt a desire for self-sacrifice. What, he asked himself dizzily, could be nobler? With a hard effort, he fought off the desire to offer himself to science for experimental purposes, then an urge to volunteer himself as a human bomb-carrier. Not out of hatred of the enemy. No, not that. Out of love for mankind. Out of—

Morrissey changed the setting.

Now Roberts felt the urgent desire to do right. What mattered most in life was the knowledge that he was doing right. He stood straighter. He asked himself, *Was* he doing right? Suppose—

Morrissey changed the setting.

In his mind's eye, Roberts saw a lovely woman in a closely clinging dress. He saw her move her long legs as she walked toward him, smiled sweetly, and lifted her arms—

Wham!

Morrissey, Hammell, and Roberts hit the switch at the same time.

Hammell grinned. Morrissey swore. Roberts said, "Well, Morrissey, *now* we know what you've got here."

"That's more than *I* can say. What is it?"

"It's a want-generator, that's what it is. A desire-stimulator. And if we can't get a stranglehold on this planet with it, and lever the population around so we can get that ship repaired, *I'll* be surprised."

Morrissey blinked. *"How?"*

"Why, what's the cause of the trouble? The people here are destructive, and they're disinterested

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in work. They hinder, not help. Right?"

"Right."

"Then all we have to do is get them to *want to create,* rather than destroy, and to *want to work*, right? And *here* we have a *want*-generator, that plays the range of human desires like the keys of a piano. Once we find the right settings, where's the problem?"

"You're right," said Morrissey. "Here I've been complaining because we happened to hit on this when we're stuck in this miserable place. It never occurred to me this might get us *out* of here."

"It shouldn't be any great problem," said Roberts. "Let's keep trying till we get all the settings we need."

In the next few hours, they felt one desire succeed another in seemingly endless variety, and then abruptly Roberts was filled with the undiluted urge to achieve.

"That's it!" he said.

"You've hit it," Hammell agreed. "There's one setting."

Morrissey carefully noted it, and went on, until suddenly they had a sensation they'd had before, of eagerly wanting to do something, *make* something, create—

"That's it!"

Hammell nodded. "That gives us what we want. That is, what *they* should want."

"Now," said Roberts, "we've got to find out the range of this device, whether it can broadcast, or whether the set has to be physically present to work. We may have to make other sets—"

"If so, we're hung up," said Morrissey. "We don't have the spares here to make another of these."

"The technicians may have spares."

"Their having them and our getting them are two different things. I had to trade them two guns from the emergency kit, and a lot of ammunition to get them to look after Cassetti, Matthis, and Warner. They'll want something in return for spares, and they're hard bargainers."

Roberts looked at the set thoughtfully. "You don't suppose there's a 'desire to be cooperative and helpful' there, do you?"

"Hm-m-m," said Morrissey. "Let's see." He reached down for the timer, and suddenly Roberts felt a distinct urge to take poison.

Hammell swore. "That's not it."

Morrissey tried again.

A peculiar murky indefinable longing none of them had experienced before came across.

Morrissey said, "I hope we can find something better than that." He tried again, and again, until at last Roberts said, "Hold it!"

He had never felt more agreeable and obliging in his life.

Hammell sighed. "Right on the nose."

Morrissey noted the setting, then glanced at his watch. "It's getting pretty late. We'd better check again to be sure everything's tight."

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Once they'd checked the tender, Roberts and Hammell again realized how tired they were. While Morrissey eagerly went back to work, Roberts and Hammell went to sleep.

The next morning saw the start of a week of painstaking experiment. Where the first work had gone smoothly the next steps were maddening.

"Damn it," said Morrissey, "it's just *impossible* to broadcast this signal, or aim it, or focus it. At this rate, we'll have to take the set into the city, and *hide* it there somewhere."

Roberts had another worry. "If we trade with those technicians, we've somehow got to block out that generosity signal. Otherwise, we'll probably end up by giving them the set."

Another week crawled by, and then in desperation, they discovered that a supertranquilizer pill, several tins of which were in the emergency chest, not only stopped them from worrying how long the delay would last, but also solved the problem. It stopped them from feeling any perceptible want or desire, natural or induced, at all. Once they took the pill, they were as good as vegetables for the next four to six hours.

"O.K.," said Roberts. "Now, how are we going to work this?"

Morrissey said, "We'll take apart the want-generator, and make a communicator, then I'll tell the technicians we've got some extra guns, ammunition, protective suits, and so on, to trade. I'll ask for circuit components, and also some things we don't especially want, so we have a little leeway in trading. Before they get here, we'll make the circuit back into a want generator. When they land, I'll take a pill, turn the want-generator on then."

"We'll need to be very sure it's on the right setting," said Roberts.

Morrissey nodded. "Don't worry about that. I'd probably better turn it on low, and then gradually step up the power, so they don't notice it. Meanwhile, you and Ham will have taken pills—"

Hammell objected, "The trouble with that is, we won't be able to react right. We're going to act like zombies."

Morrissey thought it over.

"When I set up the meeting, I can say we've been knocking ourselves out, can't think of any solution, and so on. They'll expect us to look depressed."

Roberts nodded. "That ought to help, anyway."

Hammell said, "What about when they leave?"

"Before that, I'll start to cut down the power. After they leave, I'll step it up again, so they don't come to their senses the minute they get out of the clearing. If we work it right, and try to make reasonably decent trades with them, they may never guess a thing."

Roberts nodded. "Just so *they* don't skin *us*."

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It was just a few days later that the technicians came, in two medium-sized skimmers. They were bearded, bristling with guns, and gave the impression of watching in every direction at once.

As soon as the skimmers dropped into the clearing, Roberts and Hammell each dutifully chewed up his pill. They'd scarcely swallowed the last gritty bits when a layer of glass seemed to slide down over the world. They could *see* through the glass, but nothing out there really meant anything, ever had meant anything, or probably ever would mean anything. So there was no point getting excited about nothing.

Tranquilized into two-legged vegetables, Roberts and Hammell trudged outside, while Morrissey bent at the set.

The technicians climbed out of their skimmers.

Roberts and Hammell shambled across the clearing. Morrissey dropped out the hatch, and drifted after them.

The technicians stared at them, looking bemused.

"Poor guys," said one.

"Yeah, you can sure see *they've* been clobbered."

"Remember what it was like for us last winter? It's hit them already."

Roberts and Hammell listlessly raised a hand in greeting.

A burly giant with a bristling red beard, said, "Ah, fellows, we're all in the same boat. Do we have to *trade* with these poor guys?"

The rest of the men shifted their guns in embarrassment.

"After all," suggested a small wiry technician with a rifle in his hand, a knife on his belt, and a pistol butt protruding from under his armpit, "we're *all* human."

"Sure, why be greedy?"

Someone mumbled, with a catch in his voice, "They'll have trouble enough, anyway, no matter what *we* can do for them."

Roberts had the impression of looking out through a glass wall, and sensing invisible forces that beat powerfully on the other side.

A technician with a scar down the side of his face, and a tough, no-nonsense cast of countenance, suddenly shut his eyes. Tears ran streaming down his cheeks.

Roberts' brain sluggishly added up two and two. He reached back, and shook Morrissey by the arm.

"Turn it down."

Morrissey nodded listlessly, and headed back for the tender.

The technicians were now choking, trembling and struggling to keep control of themselves.

Roberts said nothing, because the technicians were clearly too choked up to talk.

Morrissey disappeared into the tender.

The red-bearded giant thrust his right hand out, palm up. He began, "*Anything* we can do—"

Roberts, through the dull placidity imposed by the supertranquilizer, sensed a sudden lessening of

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force outside the glass wall. Suddenly there was no force there at all.

The red-beard frowned. "Within *reason,* of course—"

Another of the technicians wiped his eyes with his sleeve. "After all, *we* have to live, too, you know."

Roberts glanced around.

Morrissey was just coming out of the tender.

The scarred technician said flatly. "Those that are fit to survive, *survive.*" He eyed Roberts and Hammell. "Nature weeds out the incompetent."

By now, every eye amongst the technicians was drying fast.

"These supplies weren't easy to get," growled the red-bearded giant. "*If* you have something to trade, we'll be willing to *consider*—"

Morrissey paused, halfway out from the tender, with a strange expression on his face. Then he turned around, and plodded back again.

The small wiry technician shifted his gun around, and alertly watched Morrissey go back into the tender.

"What's *he* doing?"

Roberts struggled to get some kind of idea through the glass wall.

"He . . . he's got indigestion."

Hammell, with a look of painful effort, said carefully, "Can't keep anything down."

"Could be ten-day fever. Has he got spots on the backs of his hands?"

The air outside the glass wall seemed to suddenly thicken again, then got thicker yet by graduated stages.

Tranquilizer or no tranquilizer, it came through to Roberts that Morrissey was botching the job.

Tears were spurting out of the technicians' eyes. The short, wiry technician rushed forward and emotionally offered Roberts his gun. The giant red-beard, weeping uncontrollably, clasped Hammell like a brother. Before Roberts could figure out what to do, he found himself surrounded by piled-up supplies, with the technicians wringing his hands tearfully, and then, apparently unable to bear their emotion, they all piled into one of the skimmers.

"We'll be back! We'll bring you more axes, and seeds, and everything. Just tell us what you need! We really *want* to help!"

The skimmer shot up over the trees, and vanished.

Morrissey, watching at the personnel hatch, faded back inside. A moment later, the air seemed to thicken like glue. Roberts still felt no emotion, but he found it hard to think or move.

Hammell, carrying a gun in each hand, looked stuporously at Roberts.

"Wait till they get out of range—Not that it matters, of course."

"Nothing matters."

"No."

Hammell dully picked up more of the supplies. "Probably we ought to take in everything we can carry."

Roberts took an armful, and followed Hammell. Just as they reached

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the hatch, the swirling thickness outside the glass wall let up.

Out beyond the clearing, there was an outburst of snarling, thrashing noises.

It occurred to Roberts that if the device affected the local animals, there could have been half-a-dozen predators out there, taking mercy on their prey.

But that was all meaningless. Roberts climbed in, set down his load beside Hammell's, then stood waiting, sunk in blank tranquillity. Finally, they roused themselves long enough to go into the control room and sit down, torpid and stupefied, till the pills wore off. By that time, it was starting to grow dark outside, and they were asleep, unaware of the opening and shutting of the hatch, and the sound of a pair of feet traveling back and forth past them.

Early next morning, as the first glow of dawn began to light the portholes of the control room, Roberts came awake.

A blaze of light was pouring through the slightly opened door of the general-purpose room between the control room and the inner air lock to the cargo compartment. It was in that general-purpose room that Morrissey was working on the communicator.

Roberts, feeling almost fresh for a change, sat up, stretched, peered at the lighted doorway, and asked himself what Morrissey was doing.

Roberts got up, opened the door wide, and looked in.

A wooden frame, made apparently of odd scraps from the cargo compartment, met Roberts' gaze. On different levels of the frame sat a variety of electrical circuits, connected by loops of wire. Roberts could recognize three separate circuits that looked like the want-generator.

Morrissey straightened, beaming.

"Those technicians brought along a good selection."

Roberts looked at the frame. "What have we got here?"

"Why, I wondered if it would be possible to make two or three of these sets, and get them to reinforce each other. There were more than enough components out there, so I tried it, using very low power, and trying first one set, then two, then three together."

"What happened?"

"Well, with two, I seemed to get less than twice the effect, and with three, there was no effect at all."

"None at *all?*"

"No, it was the same as turning them all off. It occurred to me that they might be interfering with each other. I tried gradually stepping up the power on one of the sets, and turning down the others. Nothing noticeable happened. I had them set to create desire for sleep, and I was sure I'd notice that. But nothing happened. While I was mulling this over, there was a buzz from the communicator. I snapped it on, and the voice

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of one of the technicians snarled, 'What kind of gas did you use on our people?'

"I was stupefied," said Morrissey. "I didn't even realize what he was talking about. 'Why,' I said. 'What do you mean?'

" 'You know damned well what I mean.'

" 'No, I *don't.*' Then all of a sudden I *did* know. I'd been so stupefied by the tranquilizer that I'd done a clumsy job, and they'd sensed it. But, I kept my mouth shut, and he said angrily, *'What did you use?'*

"I said, 'Can *we* help it if we've had so much trouble they were sorry for us?'

" 'Oh, they were, were they? Suppose *you* tell *me* these troubles, while I'm out of range of your gas or whatever it is. Go on. Let's hear it.'

"Well," said Morrissey, "that gave me a chill. If I couldn't convince him, there was no telling what might happen. And he didn't sound very easy to convince. I could only see one possible way out. It seemed to me that there *had* to be *some* effect from these three circuits. Certainly, they didn't do anything here. Could they, then, be producing an effect somewhere else? It was worth a try. I started telling him all the trouble we'd had—and meanwhile I varied the current to the three linked sets, and listened for some response.

"I told him all about how the accident happened, how the gravitic field distorted and held the circuit breaker shut till a section of coil burned out and vaporized, and how the next distortions knocked half the storeroom, and the spare gravitor wire, out through the hull. Then I told him what a desolate part of space it happened in.

" 'Tough,' he said.

"It was obvious I hadn't got through yet. Next, I told him how we jury-rigged the main gravitor, using wire from the tender's gravitor. I told him about all the trouble we had, from then till we got to this planet. I told him how when we got here, no one showed any interest in us. I told him how the gravitor had knocked out the ship's communicator, so we had to use the one in the tender, and we couldn't get any response with that. I told him how we rewound the tender's gravitor, came down, and at the last minute, it malfunctioned, and we missed the spaceport and smashed down in the forest.

"About this time, he said it was too bad we hadn't just fallen into a sun and got it over with quick. I kept readjusting the circuit. I told how Cassetti risked his life to try and fix the tender's gravitor, and how Matthis and Warner tried to save Cassetti, and all three were all but hashed when we hit. I described the trouble we had when the gray cats tried to get us, and when the bats got in here, and the giant thing with the big head, long snout, and battering-ram tail. He said he was getting bored, and hurry it up. All

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the time, I kept varying the current. In my mind, I had a picture of the want-generator sweeping the surface of the planet, the field moving from place to place as I readjusted the controls. I had an idea how this might work, but was beginning to wonder if this wasn't just wishful thinking.

"Meanwhile, I was telling how you and Hammell trekked all the way to the City, and there wasn't a repair facility there any more. How you came back and the cultivator almost got you.

" 'And then,' I said, 'they jumped out of the way of the cultivator, and a big patch of smother brush unfolded its leaves—'

"He interrupted. 'Shorten up this tiresome tale, will you? I couldn't care less if they fell into a gangbat's nest.'

" 'Well,' I said, giving it up, 'that's about it, anyway. They stumbled out of there, came back to the ship along that path the swarm of bugs had made—'

" 'Say,' he said, 'that *is* too bad, isn't it? They had to come back on a bug trail, because there was no other way.'

"I couldn't figure out if this was sarcasm,' said Morrissey, "or sympathy. I sat there holding my breath. I didn't dare change the setting.

" 'That *is* something,' he said, a funny catch in his voice. 'All that trouble, and now when they try to come back, they've got to come back *on a bug trail.* No wonder the guys wanted to help! Buddy, we're *all* people. We've got to stick together. Why, I'd give you the shirt right off my back, now I see what you've been through. *I never wanted to help anyone so much in my life!* If I can get away, I'll be out there tomorrow, early. I want to help. I'll—'

"He went on like this so it embarrassed me. I started juggling the current to the different circuits, trying to cut it down gradually all around without changing the relationship too much. I'd figured out that it was the *relative* power to the three circuits that probably changed the focus, while the higher the overall power, the greater the effect."

Roberts said eagerly, "Could you check that, too?"

"When I got it cut down far enough, he stopped babbling, and when I cut it down further yet, he finally just sounded sympathetic. I told him we'd gladly trade for the goods we'd gotten, and I said how grateful we were for their help and sympathy, and we'd cheerfully pay for the help, but he wouldn't even think of it. I was in a sweat by the time I got through talking to him."

"Then," said Roberts, "we can use the thing *from a distance.*"

"The only trouble is, we don't know what it's aimed at. We only know the right setting to hit the *technicians.* And once they should move, we'd lose them."

"Never mind that. They left one of their skimmers for us. Hammell

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and I can go up in it—one of us can keep a lookout for flying pests, and the other can guide it. It has its own communicator. We can go to different places, and you can try different settings. When we feel the effect, we'll say a few words to let you know where we are. When we have enough of the settings plotted on a rough map, we should start to understand how to set the device to aim it anywhere."

Morrissey beamed. "And *then* we can go to work on the city."

They spent the next few days making a map, and plotting the settings that induced wants when they hovered close to any given territory. The city, they charted at night, moving low over the darkened buildings, lit from below by the heavily-shielded streetlights. Meanwhile, Morrissey developed a method for focusing the device more accurately, so as to concentrate the effect or spread it over a wide region. Then they decided that they were ready to go to work in earnest.

"You can see," said Roberts, studying the completed chart, "that we can hit any or all of the city, with one exception. The computer itself is apparently unreachable."

"Stands to reason," said Hammell. "Desires are *emotional.* The closest thing that computer has to an emotion is its set of built-in directives."

"So," said Roberts, "we have to work through the *people,* not the computer. Now, the technicians left the City for exactly the same reasons that the computer has been driven to supplying only bare necessities. The people are destructive, and uncooperative. What we have to do is to correct that, right?"

"Right," said Hammell.

Morrissey took out a sheet of paper with a list of settings. He read: "Desire for achievement, desire to excel, desire to cooperate, desire to make friends, desire to learn, desire to work hard, desire to help others — Once we get started, that computer will have the easiest time it's had since it was made."

"Then," said Roberts, "it ought to be possible for the technicians to go back. And once we get the technicians back there, and the populace cooperating, *then* there should be no trouble getting the tools made so we can repair the ship."

"Q. E. D.," said Hammell cheerfully.

"When shall we start?" said Morrissey.

Roberts said briskly, "Right now. Why not set the want-generator on 'desire for achievement,' and give the whole city a good jolt for the rest of the day?"

Hammell nodded. "They certainly could use it."

"O.K.," said Morrissey. He set up "desire for achievement" on the generator, and snapped it on. "No use making a simple thing complicated. After we let them want to achieve for a while, then we'll hit them with

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'desire to work hard,' and then 'desire to learn.' We'll have them snapped into line in short order."

Hammell grinned. "Do you suppose we'll notice much difference if we take the skimmer up late this afternoon, and look them over through the glasses?"

Morrissey nodded. "Should."

"I don't see why not," said Roberts. "They'll doubtless be out cleaning those streets. We might even see them carrying off parts of the dumps to get that out of town."

Morrissey said, "We might be able to see it without even going up in the skimmer. Some of the components the technicians left look to me like they'll work the 3-V on the comset here. All I have to do is put them in, set up for one-way viewing so we don't get snooped by mistake, and —*Voila!*—we can pick up the City's own 3-V news broadcast."

Roberts nodded. "O.K. Set it up."

"Good as done," Morrissey said.

Roberts and Hammell spent the rest of the morning hunting from the skimmer, and came back with an animal like an antelope, and two smaller animals, like large woodchucks. The afternoon, they spent strengthening the cargo sections, and refitting its hatch. By now, the big cats had learned to be wary of the tender, and the rest of the daytime carnivores were in awe of the strange three-legged beast. But the nighttime animals appeared to be in awe of nothing.

While Roberts and Hammell worked on the tender, Morrissey, in the general-purpose room, could be heard whistling cheerfully.

"O.K.," said Roberts, when they had the big cargo-hatch tight, and the sun was dropping toward the horizon, "want to take a look at the city?"

"Sure."

Roberts called cheerfully to Morrissey. "Want to come along? We're going to take a look from the skimmer."

"Go ahead. I've almost got this screen done."

Roberts and Hammell got their guns, climbed into the skimmer, and watched the clearing drop away below. The ground flashed past, forest giving way suddenly to neat rows of crops. Far off to the south, a dust cloud crawled across the gound, and they realized it was the cultivator coming north again.

"Good to be up here," said Hammell.

Roberts glanced around, to see no flying predator nearby. "It sure is." He pointed up, toward *Orion,* orbiting unseen far overhead. "And let's hope we're up there again pretty soon."

Just then, far ahead, the City rose up over the horizon, and seemed to flow swiftly toward them.

Eagerly, Roberts raised the high-powered glasses.

The City sprang closer, clouds of smoke pouring up near its center.

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Frowning, Roberts adjusted the magnification.

The scene visibly enlarged, and grew clearer as they rushed toward it.

In the streets, rioting mobs battled lines of roboid police.

Hammell said eagerly, "Have they accomplished much? Does the City look improved?"

Roberts swallowed.

Hammell said, "Let's see."

Speechless, Roberts handed over the glasses.

Hammell stared through them at the city. His mouth opened and shut.

Roberts swung the skimmer further north, toward the center of the upheaval.

Hammell handed back the glasses.

A second and closer look corrected Roberts' impressions. It wasn't a riot. It was a war. The police robots were being overturned, and smashed with sledgehammers and lengths of pipe. The humans were steadily forcing their way into the center of the city.

If the roboid police were destroyed, there would be nothing to protect the computer. If the computer were destroyed, the ship would *never* be repaired.

"Hang on," said Roberts. He whipped the skimmer around and streaked for the forest.

Hammell said, "Did Morrissey set it up wrong?"

"I don't know. But God help us if that mob wrecks the computer."

The sun was sinking toward the horizon. To their left, a flying cloud of roughly hand-sized gangbats appeared, and turned with a flash of white teeth to intercept the skimmer. The skimmer pulled ahead, streaked along over the wide cleared lane through the forest, then Roberts located the clearing and dropped down beside the tender's cargo hatch. A few moments later, they were inside, pulled the skimmer in and locked the hatch.

In the personnel section of the tender, the communicator was turned up high.

". . . Now being driven back along the main avenues leading from Planetary Control. Again we urge all citizens to remain indoors and avoid joining in this disturbance. Unnecessary loss of life can be avoided only if all law-abiding citizens remain in their assigned quarters . . ."

Roberts and Hammell climbed the ladder to the air lock, stepped in, pushed open the inner door, and found Morrissey in a glare of light, staring at something out of view from the door. Roberts stepped forward. By the communicator screen, a pair of whirling hypnotic spirals seemed to briefly catch his gaze, drawing one eye slightly to the right and the other to the left, till a scrambled chaos of light and shadow on the screen suddenly took on depth and sprang out into the room, and now Roberts was looking at a fleeing mob, their discarded weapons rolled over by police robots sweep-

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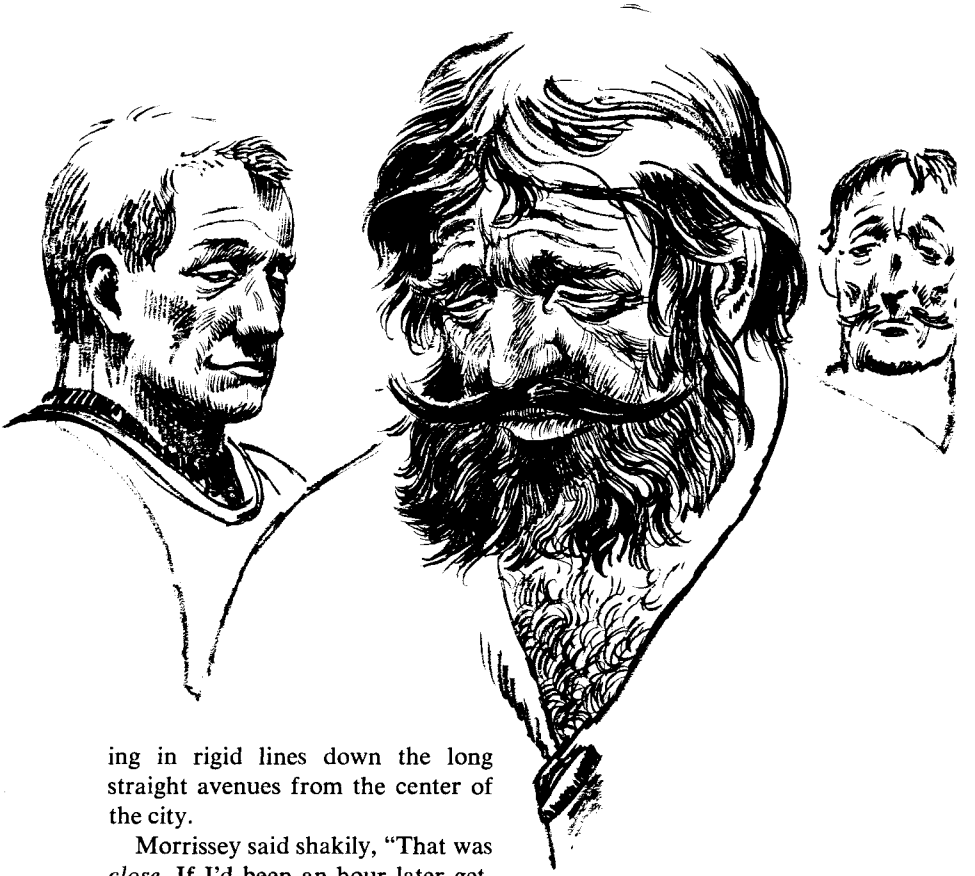

ing in rigid lines down the long straight avenues from the center of the city.

Morrissey said shakily, "That was *close*. If I'd been an hour later getting that 3-V fixed, I wouldn't have known what was going on till too late."

"What happened?" said Roberts. "They acted like they were set up to 'want to revolt.' "

"I checked that," said Morrissey. "What I had set up was 'desire for achievement,' all right. What we overlooked was, what *kind* of achievement? Suppose they think the greatest achievement would be to *overthrow the computer and the robots?*"

Hammell turned to Roberts. "Remember what they yelled when they threw the bottles at the maintenance robots? *'Kill* the mechs!' "

"Ye gods." Roberts glanced at Morrissey. "What did you do to stop them?"

"Set the want-generator for 'desire to give up,' and beamed it at them, full power. Naturally, the computer and the roboid police weren't affected, so in almost no time, they had things under con-

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trol. I've been cutting down the power since then."

Hammell swore. "There goes *that* setting. We won't get much help from 'desire for achievement.' "

Roberts was frowning. "It's worse than that. It means we don't know how they'll react to *any* desire."

Morrissey nodded. "Look at this." He hit the "Replay" button, and a recorded view appeared, showing an apartment house door coming slowly open. A crafty individual with a knife eased out, carrying a cord, on which was strung about a dozen odd objects. As he peered around, something flicked into his neck from the side, he clawed at his throat, staggered to the sidewalk, and a moment later a second figure greedily took possession of the string, bent over the fallen figure to take it by the one ear, pulled out a knife, briefly tested its edge with a thumb—

Morrissey hit the "Replay" button.

Black smoke poured out of a building. A set of scurrying figures ran past carrying a torch, sprinted down the block, hurled the torch through a window, threw half-a-dozen bottles in after it, and dove into the gutter. A yellow flash and flames roared out the window, to climb high up the side of the building.

"Accomplishment," said Morrissey dryly. "Collect ears, burn buildings, smash the town to bits."

Roberts snapped the switch, to see what was happening now.

At once, a mob appeared, racing in full flight down a street where no roboid police were anywhere in sight. Screams of terror mingled with the blare of loudspeakers:

"Be calm! *You are in no danger!* No punishment is intended for those who took part in this disturbance!"

Someone screamed. "They're after us!"

The loudspeaker boomed. "Be calm!"

Someone screamed.

"HERE THEY COME!"

Roberts glanced at Morrissey. "Better turn that thing down."

"I've *already* got it turned down almost all the way."

On the screen, the mob was running so fast that anyone who hesitated was immediately trampled underfoot.

"The trouble," said Morrissey, "is that once they get going, they go faster and faster all by themselves. They build up a kind of inertia all on their own."

The communicator was saying, "This view is typical of the streets in a twenty-mile ring around the Planetary Control Center. All citizens are urged to remain indoors. Repeat, all citizens are urged—"

Roberts said, "We've got to stop it."

"What would you suggest?" asked Morrissey.

"How about 'desire to fight'? That ought to nullify the panic."

Hammell nodded. "They can't be scared and mad at the same time."

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Morrissey didn't say anything, but glanced at a list of settings tacked on the want-generator frame, then bent over it carefully. He straightened and glanced at the screen.

The screaming mob rounded a corner and there was another terrified mob coming from the other direction. They fled headlong straight into each other, hit like two avalanches in collision, and were strewn all over street and sidewalks by the impact. They then suddenly looked furious, and sprang to their feet.

"Quick!" shouted Roberts. "Shut it off!"

"Done," said Morrissey.

On the screen, the mingled remnants of the two mobs waded into each other savagely.

"For—" Roberts looked on, speechless.

"It's *started,"* said Morrissey, "so it *goes on by itself.* Each one of them saw someone else glaring at him. That was on account of our want-generator here. We turned that off. But already, they were swinging at each other. And the punches connected. Well, what would *you* do? Now they've got *real* reasons to be mad. You want me to set it up for 'desire to flee' again?"

"No. This is just one scene. For all we know, on other streets they're still running. Or maybe they're fighting and running at the same time. Set it up for 'desire to sleep.' I don't see what harm *that* can do."

On the screen, the combatants gradually seemed to run down. They looked around, yawning.

"Quick!" said Roberts. "Shut it off!"

"Off," said Morrissey. "I'm getting quick at turning this thing off."

Hammell said, "Why not leave it on? Get them quieted down, and—*Oh."*

Fire was crawling forward up the block, and now burst out the windows fronting on the nearest street.

"I was afraid," said Roberts, "they'd get caught in the fire."

"This disgraceful riot," the communicator was saying, "has caused damage that may not be repaired for years. Your city administration, human and roboid, will attempt to rectify the situation as rapidly as possible. But any improvement will be contingent upon your cooperation. This upheaval has cast doubt upon many fundamental beliefs firmly held in the past, and in future it may be necessary for your administration to use stronger methods to maintain law and order. It is fervently hoped, however, that—"

"Shut it off," groaned Roberts.

Morrissey reached over and snapped the switch.

"Great space," said Hammell. *"All* we did was beam 'desire for achievement' at them for a few hours. How did all this mess come about?"

"Obviously," said Morrissey, "their idea of achievement just wasn't what we had in mind."

"Sure, but that isn't what I mean.

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Look, it was only a *little time*. A few hours, that's all. How did a full-fledged revolution get going *in that length of time?"*

Roberts shook his head. "What's the big problem in getting anything changed? Creating *desire* for the change. To get a reform pushed through, for instance, there has to be a lot of argument just to get people headed in the same direction. With *this* device, we may get through that stage in a few minutes."

"Only," said Morrissey, "we don't know what will happen till we've done it."

"The trouble," said Hammell, "is that they just aren't *educated*. If they were educated, they'd want exactly the same things *we* want. Let's set up 'desire to study.' We've got that, haven't we? *Sure* we have. I remember."

Dubiously, Morrissey said, "I don't know. It seems to me—"

"Yes, we *have,"* said Hammell. "I remember when we hit it. All of a sudden, I got an urge to study circuits, memorize formulas—"

"Yes," said Morrissey, "I *know* we've got 'desire to study' on the list. *Sure* we can hit them with that. But then what? I've had enough of being sorcerer's apprentice for a while."

"What harm could it possibly do?"

"I don't know. But that doesn't prove it *won't* do harm."

"The trouble," said Roberts, "is that we just aren't used to this thing yet. We need more practice. This is like stepping out into space for the first time, when you've grown up on a planet. The thing is strange. But that doesn't mean you won't master it, with practice."

Morrissey looked slightly encouraged. "It *is* true that this is the first time we've used it."

"Sure," said Hammell. "We were bound to have trouble."

"But," said Roberts, "already we're getting used to it. We know, for instance, that the effect builds up a lot faster than we thought. And we also know that, once started, there's a sort of inertia—the thing tends to keep going by itself."

"Well," said Morrissey, "when you put it that way—maybe things aren't as bad as they looked. But I think we'd better lay off for a while, anyhow. I'm about done in."

Roberts nodded. "They're about done in in that city, too."

"But *tomorrow,"* said Hammell, "we can start educating them."

Early the next morning, they tuned in the City. The scene on the 3-V looked like exactly what it was —the morning after a small war. Roboid fire-fighting equipment battled fires in buildings and smoldering dumps, while first-aid crews shunted riot-victims into big many-wheeled ambulances that rolled away with a dozen patients at a time. Whole buildings, and long stretches of street and park, were like mountains of white foam, but more fires still burned on, and the prostrate

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forms in the streets plainly numbered in the hundreds, if not thousands.

"Whew," said Morrissey, glancing from the 3-V to the want-generator. "I don't know. I'm almost afraid to touch this thing."

"Don't worry about that," said Hammell, "a little education will straighten everything out."

"How do we know they can get anything *to* study? Does the place have a library?"

"It's bound to," said Hammell. "Come on. Let's get on with it."

With visible reluctance, Morrissey turned to the want-generator. Then he shrugged, glanced at the list of settings, and got to work.

Hammell glanced at Roberts. "I wish they'd had something like this when *I* was in school."

Roberts nodded absently. He was starting to have doubts about this approach. "How long is this going to take? Education is great, but it's kind of a long-range proposition. We want to get off this planet some time in the foreseeable future."

"Well," said Hammell, "we worked up a small war in less than a day."

Morrissey straightened. "There we are. Now, what do we do? Shall we all watch it at once, or should we set up a system of watches?"

Hammell shrugged. "Why not let it work for an hour or so? 'A watched pot never boils.' "

"No," said Morrissey. "It doesn't boil *over*, either."

Roberts said, "I don't see how it could do any *quick* damage. Suppose Hammell and I work for a while on the game we caught yesterday? If you want, you can keep watch on the 3-V."

Morrissey nodded. "What happened yesterday makes me uneasy."

"Nothing bad," said Hammell positively, "can possibly come out of education."

Morrissey visibly readied a sharp reply.

Roberts poured oil on the waters. "Probably nothing will happen, but there's no harm being on the safe side. Let's go see if anything got in last night."

Hammell nodded, and went along with Roberts into the cargo compartment.

"Well," he said, "we should have fresh meat pretty soon. Nothing got in here last night."

They examined the game they'd caught the previous day, bled, gutted, and then hung up till they had time to skin it. Then they got out their knives.

An hour later, their knives were blunted, and their hands sore.

Hammell growled, "It couldn't be harder if it were frozen."

The stiff skin, held to the meat by tough membranes, gave way an inch at a time.

"Whew," said Roberts. "No wonder those technicians seemed so ugly. Probably everything they've got only came after a struggle."

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Hammell nodded. "Or maybe they got that way from *eating the meat.*"

"That's a thought." Roberts eyed the animal with calculating gaze. "We've got to figure it out somehow. Those emergency rations were meant for a whole crew, but they won't last forever."

"Yeah. Well, if we keep at it—"

From the other end of the tender came Morrissey's voice:

"Ah, for the love of . . . Well, GREAT HOLY LEAPING . . ."

Without a word, Roberts and Hammell jumped up, and headed at a run for Morrissey and the 3-V set.

"Just listen to this," said Morrissey.

". . . Will be done," the communicator was saying, "in order to supply suitable study materials. We repeat, however, that books, films, spools, and exhibits on such subjects as shoplifting, explosives, safecracking, mental-suggestion, seduction, death rays, hypnotism, aphrodisiacs, sabotage, secret jujitsu blows, and undetectable murder methods are forbidden under a law which has just been enacted. However, if anyone wishes to learn about anything else, the necessary materials will be provided, following due and careful consideration of the request."

Hammell sagged against the bulkhead.

Roberts shook his head. "*Another* zero."

Morrissey had an odd smile on his face. "What next?"

"First," said Roberts, "we don't get discouraged. We've got to keep trying—"

"Sure," said Morrissey. "If once you don't succeed, try, try again. If twice you don't succeed, try, try again. If three times you don't succeed—"

Roberts said, "What do you say I take the next turn at this?"

"Anything so I don't have to watch any more of it. What are you going to try?"

Hammell said uneasily, "I know the last one didn't turn out, but I've got another idea."

Morrissey smiled. "Sure."

Hammell thrust out his chin.

Roberts said, "Try it. If we're going to get out of here, we've got to get *some* kind of improvement started. Just watch it."

"I'll watch it," said Hammell grimly. "You go ahead."

Morrissey said, "It's all yours. I'm going on vacation, starting now."

"Bring your knife with you," said Roberts. "I hope it's sharp."

Roberts and Morrissey had been wrestling with the local variety of antelope for the better part of two hours, when a stream of incredible profanity burst out on them from the other section of the ship. They sprinted for the air lock.

". . . Miserable, brainless, incorrigible *cretins,*" Hammell was snarl-

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ing. He glanced around at Roberts. *"Look at this.* I set up 'desire to work.' "

Standing out from the screen, in realistic three-dimensional solidity, was a small crowd with hammers, pipes, and crowbars. As they moved back, it was possible to see that they were crowded around a half-disassembled police robot. Proudly, they took out gears, shafts, and small electric motors, and divided them up amongst themselves.

". . . Sort of activity," the communicator was saying, "will not be tolerated, nor will further removal of paving blocks, door and window frames, or lengths of gas or water line. Your law-enforcement agency orders you to cease and desist from further demolition, remodeling, and private unauthorized construction. Strict penalties will be imposed . . ."

"That does it," said Hammell.

"Well," said Roberts, "we've only started—"

"O.K., *you* try it." Hammell went out the air lock. Morrissey lost no time following him.

Roberts found himself alone, eyeing first the want-generator, and then the sight of a weird structure, built of torn-up paving blocks, that was rising in the middle of a street, blocking the two center lanes.

"Whew," said Roberts. He went out into the control room, sank down in the control seat, tilted it back, and just let his mind drift. A few ideas came into his field of consciousness. How about 'desire to do right'? But that depended on what a man thought was right. How about 'desire for progress'? Roberts didn't think he and Morrissey and Hammell had hit on that setting yet, but even if they did, what would that produce? Whose *idea* of progress? How about 'desire for religion'? His mind presented him with a picture of devotees hurling babies into the flaming idol.

Roberts groaned, lost the thread of his thoughts, fell into a kind of stupefied daze, and emerged thinking, "Obviously, one man can't figure this out. It will take *everyone* to do it."

He woke up abruptly to ask himself what this meant.

Then suddenly he sat up. He swung his legs over the edge of the tilted control seat, and balanced there, hanging tight to the idea.

Everyone has got to do it.

Do what?

Figure it out.

How can that be?

Everyone will have to think.

But how?

Everyone will have to want to think.

Without *wanting* to, they won't do it, and every other desire will lead to a mess.

Roberts got up, frowning, and walked out to look at the list tacked by the want-generator. Halfway down was the notation: "Desire to meditate, consider, think things through."

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From the other part of the ship, he could hear heavy breathing as Hammell and Morrissey wrestled with the tough hide.

Roberts looked at the notation again, then studied the linked want-generators. Carefully, he disconnected one from the others, adjusted it to the proper setting, and turned it on, using low power.

At once, he had a strong insistent desire to think things over. What did life mean? Did what he was doing make sense? How—

Roberts carefully cut the power further.

"Hey," came Morrissey's voice. "What are we using *knives* for?"

"Agh!" said Hammell. "How could we be so stupid? What we need for this beast are hatchets. Wait a minute."

There were rapid footsteps, then a moment later, there was a *whack* and a grunt. "Ah, that's better. *Now* we've got a chance."

Roberts connected the want-generator back into the larger circuit, and considered it carefully.

What *was* the chief difference between men, anyway, except that some men thought more and deeper than others, and put the thoughts into action?

Carefully, Roberts adjusted the want-generator.

One hand on the switch, he asked himself, "Is 'desire to think' the cure-all? Anyway, it's one of the ingredients, and probably the one that's missing. They've got plenty of experience. But is it all such one-sided experience that they'll end up with the *wrong conclusions?* Then what?"

Exasperated, Roberts paused to set the power lower yet, and threw the switch.

Then he went out into the air lock, and called Morrissey.

Morrissey came over, entered the hatch, and followed Roberts through the air lock, to hastily glance at the 3-V.

Nothing was visible save a few people wandering around with looks of vague disquiet, as if they had just remembered that they wanted to do something, but what was it?

Morrissey looked at the want-generator to see if it was on, blinked in surprise, and studied the setting.

" 'Desire to meditate, consider, think things through.' Why didn't I think of that?"

Roberts shook his head. "It won't work. Count on it. It looked great a minute ago. But it's not enough."

"At least, they aren't tearing the place to pieces."

"No, but we've got to work in some other wants and desires, or they aren't going to accomplish anything, either. Let's let 'desire to think' run for a while, then very carefully we can switch to another signal, maybe 'desire to improve,' and see what happens. If some kind of mess starts up, we can go back to 'desire to think' again."

Morrissey began to look excited. "That might work, at that."

"O.K., let's give them a vacation

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for a few hours, then start hitting them with 'desire for sleep.' They'll be in better shape to think straight tomorrow if they get plenty of sleep tonight."

"Good idea. Swell, we'll do that."

That night, the roboid police patrolled in vain. Not one crime was committed, anywhere in the city. All the humans were asleep.

The next morning, around 6:15, the people of the city began to wake up. Everything went along normally until around 9:00 a.m., when an insistent urge to think things over began to seize hold of them. The roboid police were now unemployed till noon, when the inhabitants stopped frowning in thought long enough to eat. Activity picked up to normal until 1:00 in the afternoon, when gradually everyone began feeling a progressively stronger urge to think things over. This went on until 5:00 p.m., when the populace gradually began to lose interest, stretched, and felt a desire for physical exercise.

The roboid police, who had wheeled vainly up and down the long empty streets all afternoon, now suddenly got their whole day's workout in twenty minutes. The populace chose to take their exercise by bombarding the police with bottles, trash, and broken-up chunks of paving. When the furious twenty minutes came to an end, at precisely 5:20, the populace started to lose interest, and drifted back into the buildings, where they thought things over until around six-thirty. Then they began to want something to eat, and things came back to comparative normal until around 9:00 p.m., when everyone began to yawn. By 9:30, the human part of the city was asleep.

All that night, the roboid police had nothing to do but travel up and down the empty streets.

"Now," said Hammell, "this is more like it."

Morrissey beamed. "We're starting to get the hang of the thing."

Roberts, conscious of having originated the idea, modestly said nothing.

The next day went along the same way, until 6:00 p.m., when Roberts shut down operations till 9:00.

"It's working," said Hammell. "You can see an improvement in their appearance."

"That sleep helps," said Morrissey.

"Not only that, they *look* thoughtful."

"What we're doing ought to really uplift this place," Morrissey agreed.

Roberts basked, and remained silent.

There was a jarring buzz from the communicator.

Morrissey sat up. "Who might *that* be?"

"Probably the technicians," said Hammell.

"Leave the visual transmission off," said Roberts, sitting up.

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Morrissey nodded. "How about visual *reception?*"

"O.K. by me."

Morrissey snapped on the communicator.

The three-dimensional image of Kelty, assistant-chief of the City's law-enforcement department, sprang into view. Kelty looked exhausted.

"O.K., you win, Roberts."

Roberts looked blank.

"*Roberts,*" said Kelty. "Do you hear me?"

"I hear you."

"I'm throwing in the sponge. You'll have your repairs as soon as we can get the shop set up."

"You said that couldn't be done."

"The events of the last few days have given the computer some new data to work on. That uprising came within a hairbreadth of success. The computer now knows it can be destroyed. One of the computer's built-in directives is that it safeguard itself, so long as the resulting actions aren't inimical to the long-term welfare of the populace. That directive is now brought into operation."

"I see. But why call me?"

"I've been thinking things over for the last couple of days. Believe me, I haven't thought as much in most years as I've thought in the last couple of days. The thing is perfectly obvious. First, there's the worst upheaval we've ever had on this planet. Following this, we have the most fantastic set of exasperating petty-sabotage operations, in turn followed by utter silence. Then, there is one concentrated burst of violence, followed again by silence. We have this two days in a row."

On the 3-V, Kelty shook his head. "By no stretch of the imagination could a thing like this come about by *accident.* This is a demonstration of control that stuns the mind. Control by whom? The most searching investigation, using surveillance devices all over the City, reveals not the slightest evidence of how it's done. So we're blocked there. But who *could* provide the leadership for a thing like this? Only the technicians, or complete outsiders. I happen to know that the technicians are in no position to do it. With them, in that wilderness, it's touch-and-go.

"Now then," said Kelty, "where does this leave us? We have the following events: You and your cargo-control officer present yourselves to the City government, requesting repairs. You are refused. A few weeks go by, and someone masterminds an attack that all but destroys the entity that refused you help. Following this, there is a demonstration that someone is exercising nearly absolute control over the populace. All I can say is, I'm sorry I was so slow to catch on. I've put the problem to the computer in the light of these facts, and it is prepared to rebuild the Class II repair facility at once, especially if you'll hold down the destructiveness of the populace until the work is done."

Roberts waited until he was rea-

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sonably sure he had control of his voice. "Kelty, you understand that I don't admit interfering in the internal affairs of this planet?"

Kelty nodded glumly.

"However," said Roberts, "from what you've told me, and from what we've seen watching the 3-V, it does seem that this destructiveness you speak of ought to die down for long enough to get the repair facility completed."

Kelty sighed in relief. "Consider it done. Listen, Roberts—"

"Yes?"

"I don't know who you *really* are, or what are your intentions. With such power as you've demonstrated, obviously you're far more than the captain of a cargo ship. I don't ask you to admit that. All I say is this: If you decide to fit this planet into your plans, just *tell me what you want done*. Is that all right, Roberts?"

"I hear you," said Roberts, fighting to keep his voice even.

"That's all I ask," said Kelty. "I'm sorry it took me so long to catch on."

The three-dimensional image faded out.

Roberts turned off the communicator.

Morrissey said, in a surprised voice, "That's it. That's what we've been trying for."

Hammell said hesitantly, "You know, he's right. With this device, we could exercise enormous power." He paused. "But, of course, we wouldn't want to."

"Of course not," said Roberts, scowling.

"It would be selfish," said Morrissey.

They dropped the subject, but it hung in the air afterward.

The days till now, having been filled with trouble and danger, had crept past a minute at a time. The following days, filled with success, went by in a flash. Suddenly the repair facility was done, the special tools made, the repairs finished, and the three injured men were on their way back to the tender. Roberts, Hammell, and Morrissey disassembled the want-generator, and stood watching the city on the 3-V.

"Well," said Hammell, "believe me, we *earned* those repairs."

On the screen, the people had changed in a way that was hard to pin down, but that came across as a marked increase in self-respect and self-reliance.

Morrissey said exasperatedly, "The planet's still a mess, though. Look there."

A group of youths stalked past, four abreast, wearing armbands marked with triple thunderbolts. They were neat, trim, and confident; the rest of the citizens hastened to get off the sidewalk as they approached.

A roboid policeman cruised by, plainly uncertain just what to do about this phenomenon.

"*Somewhere,*" said Morrissey, "there must be someone in that city

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who did a lot of thinking—about just how much power he could get, with the right organization."

Hammell nodded. "Kelty's going to have a great time when that outfit gets going."

Roberts was frowning at the screen. He could sense what was coming. Morrissey and Hammell both had a feeling of dissatisfaction. The job wasn't done yet.

Hammell said, "We've all got accumulated leave coming. I was wondering—"

Morrissey was frowning at the screen. "That's a thought. We ought to be able to *finish* this."

Hammell and Morrissey glanced questioningly at Roberts. Something told Roberts that they were not asking his opinion as to *whether* they should come back. They were asking if *he* wanted to come back with them.

Kelty's last comment occurred to Roberts. Kelty thought some gigantic cosmic plan was afoot. But Roberts and the others had merely been driven here by bad luck, and the want-generator was just a device they found handy to help them get away.

Roberts paused, as his memory played back this last thought, and then his perspective shifted.

The steam engine was once just a device that people found handy to pump water out of mines.

The airplane had been only a device that could hold a man off the ground for fifty-nine seconds, and in the process carry him not quite three hundred yards.

The spaceship was once just a device that could lift an experimental animal into orbit for a few days.

It was merely that kind of device that the three of them had stumbled on.

Why get excited about a thing like that?

Roberts was dizzy with a sudden vision that flashed into his mind, and as suddenly was gone.

Morrissey and Hammell were still looking at him questioningly.

Roberts waited a moment, to be sure his voice would be natural.

Then he cleared his throat.

"O.K.," he said. ■

THE ANALYTICAL LABORATORY/JULY 1966

PLACE	STORY	AUTHOR	POINTS
1.	The Ancient Gods (Pt. 2)	*Poul Anderson*	1.94
2.	The Message	*Piers Anthony and Frances Hall*	2.31
3.	An Ounce of Dissension	*Martin Loran*	3.00
4.	Survivor	*Mack Reynolds*	3.93
5.	The Signals	*Francis A. Cartier*	4.55
6.	The Missile Smasher	*Christopher Anvil*	4.67

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The Sons of Prometheus

ALEXEI PANSHIN

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So you have the knowledge of Life and Death.

And what can you do with it? How can you use it . . .

I

As the solid-wheeled, almost springless coach progressed through the rutted streets, Tansman, coming near to his destination, felt more tense than at any moment since he'd been set down on Zebulon. There was little traffic and little noise, and he looked through the coach window to see many of the adobe houses they passed shut and shuttered. He was the only passenger in the coach. He wasn't particularly afraid of sickness, so the warning he'd had against the megrim when he bought his seat for North Hill had passed over his head. Tansman was thinking of the last thing that Nancy Poate had said before he left the Ship.

It was standard advice, and he had had it before: Zebulon? Whatever you do, don't let them know where you come from. They finger-across-the-neck Ship people. (Accompanied with appropriate sound effect.) Nancy had simply reminded him that taking care and coming back were two things she expected of him. It was nice of her to say that, and—hang the irony—remember the Sons of Prometheus. ("They" being the ones who had gotten it in the neck).

Zebulon was not really the place for a chromoplastician with a positive distaste for do-gooding and an unadventurous temperament. This one, however, had a determined and formidable older cousin named Nancy Poate which was an off-setting factor beyond calculation.

"Phil," she had said, "did you, or did you not, tell me last week that you were finished with that silly set of experiments that you have been working on?"

"Yes."

"Then you need a vacation. This will be a vacation."

"Nancy, I'll grant that after Earth was destroyed in the Population Wars we owed the Colonies more than we gave them, but this sneaking around doing paternal good works to people, who just want to be left alone, doesn't appeal to me. You don't dare come out in the open because you're afraid they'll wring

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your neck and you aren't willing to leave them alone. So what do you do? You prod and you poke, you try to establish trade routes and you hand out propaganda and how-to-do-it books, and that makes you feel good. Well, I don't want it."

Nancy, bluff and unstoppable—and Tansman was convinced she didn't have herself remodeled because her appearance helped her to overwhelm people and get her own way—just nodded and said, "I knew I was right to pick on you, Phil. You won't be tempted to meddle. All you'll have to do is be there for a month, keeping an eye on things."

"No," he had said.

"Phil," she had said, "don't be stuffy." The way she'd said it had made him laugh.

So here Tansman was on Zebulon, no less stuffy for being here; reluctant fire-bringer, muttering to himself about a man he had yet to meet named Hans Rilke who was a do-gooder with an undurable liver. Wishing Nancy Poate a better occupation than coordinating the activities of do-gooders—including the replacement of their innards—he laughed at himself for being fond enough of his cousin to allow her to jolly him into doing what he didn't particularly want to do. For all that they called themselves "The Group," Nancy Poate's people were still lower-key Sons of Prometheus and Tansman had no wish to tempt either Zeus or the Ship-hating population of Zebulon. He thought again how appropriate it was that Rilke should have a liver complaint—that had been Prometheus' problem, too.

In his lifetime, Tansman had traveled a good many thousand light-years, but this was only the third time he'd been away from his home. That home was a ship built to ferry a comparative few from an over-populated Earth about to destroy itself, to make fresh starts in a variety of new places where, it was hoped, the same mistakes would not be repeated. Those carried—many of them with no belief in the altogether unlikely future they were assured was coming—took nothing but their own reasons for leaving Earth, and were then flatly abandoned with little more to keep them alive. Within fifteen years of the founding of the first colony Earth was destroyed. Earth's heirs were one hundred twelve colonies—the best of them barely at the subsistence level, and seven great ships whose crews were left in very comfortable circumstances. The inequity was felt by all the Colonies and by some of those aboard the Ships, but the only obvious reparation would have been on the order of giving each of long-dead India's billions a chip of a brick from the Taj Mahal. So Tansman was a chromoplastician in a world ignorant of chromoplasts, an incognito prince amongst sharp-toothed paupers, an uneasy rider in a coach that was now, at last, coming to a stop in a

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dusty street and under a lowering sky.

He descended from the coach, bag in hand, a tall young man wearing the slouch hat, jacket, breeches and leggings that were seasonable and stylish here. Tansman felt like a great fool. He'd never worn a hat before in his life and he kept reaching up to adjust the clumsy uncomfortable thing. He was a thin man with a thin face and a nose somewhat overlarge that he had never had altered because he had never been one to do what everybody did; also a girl he had once had a *tendre* for had told him that it made him look engaging, which, in fact, it did.

Close at hand was a flat-bed wagon with a gnarled little old man standing in the street beside it. He was wearing a leather costume that might well be seasonable, but which Tansman was sure could never have been considered stylish, and was holding a rag to his face. Tansman could sense a good reason for this: there was in the air the most unpleasant odor he had ever smelled in his life, a very penetrating smell of singed animal. The coach had stopped at the entrance to a square, the obvious center of this little town.

Perhaps fifty yards distant across the square was built a great bonfire. By the fire were four men and a cart drawn by a horse made visibly nervous by the heat and smell, so nervous that one of the men was hard put to keep the horse still. Two of the men, working as a team grabbing arms and feet and heaving, were adding the human bodies piled on the cart to those already roasting on the fire. The bodies were naked and even at this distance Tansman could see that they were disfigured with purple blotches that greatly resembled bruises, or port wine scars. These three men were wearing gloves and white cloth masks. The speed and determination with which the pair worked showed only too clearly their anxiety to be done and away. They treated the bodies like so many logs to be added to the fire. Besides the impersonality there was a distinct note of fear and distaste.

Tansman didn't share the fear since he had been quite adequately protected against the spectrum of Zebulonite diseases, including this hemorrhagic fever, before he left the Ship, but he could quite understand the distaste. He would have found it perhaps more than he could do to stand beside a great open fire and stoke it with human cadavers. The fourth man by the fire, however, seemed calm and unbothered. He was a white-robed, white-cowled, black-belted friar standing so close to the fire that the hand of one young woman, who was heaved too hastily, slapped the dirt at his feet. Apparently unmindful of heat, stench, infection or esthetics, he continued speaking, trying to add one single note of dignity to the unpleasant deaths and necessarily hasty disposal of these heirs of Earth.

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Tansman was barely out of the coach before the driver had made a sharp whistle and the horses had lurched forward. He might have to make a change of horses and this might be his ordinary stop, but apparently he had no interest in following conventional practice. Perhaps, for all the talk of plague, he hadn't bargained on a funeral pyre in the main square. Raising dust, the coach rattled to the right and around the corner, and was gone between the mud-walled buildings. The wind under the gray sky was chill and carried the dust raised by the coach.

The old man in leather was the only person on the street, the only person in view besides those by the fire. He had a gold-spot earring set in his right ear, and a wicked-looking knife at his belt. He had curly muttonchop whiskers and they, like the rest of his dirty brown hair, were shot with gray. The rest of his face looked as though it had been shaved last about four days earlier. Altogether, he had something of a bright-eyed monkey look about him.

"Mr. Tansman?" he said, taking the rag away. He had a nervous, strained look about him.

Tansman said, "Yes."

"I'm from your uncle. Hop in, boy, and let's be off."

Tansman swung his bag over the side and into the bed of the wagon, stepped on the wheel hub and up to the seat. The little man, with quick movements, freed the hitched horses, tossed the grease-covered rag he'd been holding into the back of the wagon, hopped up to the seat, and in not more than thirty seconds from the disappearance of the coach the wagon was in motion, too, headed away from the square down the rutted street.

The little man shouted to the horses and took to the street at the highest speed he could manage, clearly wishing, as much as the coach driver, to be away from this silent town of grimly-shuttered windows and unstaveable death. The wagon rumbled and shook as the wheels bounced from rut to rut. The quick old man didn't slow the pace until the last flat-topped roof had been left behind, and then he brought the team down to a walk.

"You're lucky I waited for you, boy. I wouldn't have stayed another ten minutes."

"The fever?"

"Aye, the megrim. I haven't lived these many years to end my days being sizzled in the town square and I don't fancy walking around with half my mind leached should I survive the megrim, neither." He looked at the blank sky. "I should have known. The megrim is no more than you should expect when five moons are full and the shippeens are about."

Tansman said, "Do you work for my uncle?"

"Yes. Old Garth, they call me."

"How do you do?"

"Well enough, thankee, lad,"

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Garth said, almost absently. He gave one last look back to the town, as though he expected to see something monstrous sneaking up on tiptoe to catch them unawares. He lifted the reins in hands twisted and brown like roots. "Let's do our chatting later. The soonest away, the better."

The countryside to the left was small hills rising away; to the right it was reasonably level as far as the eye could see. The road followed a hill slope down from the town to meet the flatland. The soil was the color and texture of the adobe buildings in town, cracked tan mud. There were no trees on either hills or flats, just sparse gray scrub. They reached the flatland in less than ten minutes, and here the road continued, almost straight and almost level, parallel to the line of hills. In another mile they came to a crossroads.

There was a sign that read Delera and pointed toward a break in the hills. The road followed the pointing finger of the sign. The sign knew enough to stand and point; the road, following the sign's advice, was lost in the hills. Old Garth, without slackening the wagon's speed, brought the horses left and they turned toward the hills.

Just beyond the crossroads, however, there was a white-robed figure carrying a traveling bag and trudging toward the hills. The impression that the figure gave to Tansman was of unyielding determination, that no matter how long it took, its steady, even, foot-after-foot pace would be maintained until it arrived at its destination.

Garth brought the wagon alongside. Perhaps Tansman's impression came in part from the fact that it was only then, for all their noise and the dust they raised, that the friar noticed their presence.

"Good afternoon, Brother," Garth said. "Do you care to ride?"

The friar turned his head and looked at them. "I'm going to the monastery at Delera." He was a pleasant-looking man of middle age, stubby and stout.

Garth said, "That is where we are bound."

"Well, bless you."

The wagon lurched forward again with the friar sitting in back, brushing dust from his robes. Sitting on his own bag and using Tansman's larger bag for a backrest, he managed to have a seat that was reasonably stable and reasonably comfortable. He introduced himself as Brother Boris. He had a red face and just a fringe of hair, and a thoroughly plebeian look, but he also had that air of determination and detachment that was somehow more impressive than his looks. Tansman's curiosity was piqued.

Tansman half-turned on his seat to speak to the friar, who was sitting just behind Garth, and asked, "How do you happen to be traveling with the fever abroad?"

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Brother Boris smiled, "The business of the Confraternity doesn't wait on the megrim—in fact, just the opposite. The megrim is a sign that the Men of the Ships are about and then the Confraternity must be particularly watchful. Heresy, evil and disease travel together—and the effects are a certain sign of the cause."

Garth spoke without turning his head. "It's as I told you," he said, "when all the moons are full, the shippeens are abroad."

"No, my son," Brother Boris said. "You must not believe that. What you have said is rank superstition. The Confraternity has kept careful records—as I may say, I having spent a year assigned to the task when first I aspired to the Questry—and the phases of the moons have nothing to do with the Men of the Ships. During the year I labored at the records, a nest of Shipmen, openly proclaiming themselves and calling themselves The Sons of Prometho, were eliminated by the Confraternity and at that time Aleph and Veth were full, Gimel was in the last quarter, and Daleth and Beth were new. Only once in fifteen Aleph months are all the moons full together, and heresy, evil and disease and the men that spread them are to be found in any month."

"But still," Garth said, "the moons are full now."

"Yes," Brother Boris said. Then he said to Tansman, "And why are you traveling when the moons are full?"

Tansman said, "When I set out, I didn't know there was danger of the megrim, and by the time I learned, it was easier to go on than to go back. I'm going to run my uncle's store. Garth here works for my uncle."

It had been agreed upon that Rilke would be known as Tansman's uncle. This had struck Tansman as odd because he knew that Rilke and he were within a few years of the same age—he was forty-six and Rilke a little older—and he would have thought that making them brothers, or cousins, might have been more appropriate. The choice had been Nancy Poate's, however, and Tansman hadn't been interested enough to argue any points with her.

The friar asked, "And what is with your uncle?"

"He journeys to see his parents. I doubt news of the megrim will stop him. They're very old now, and ill, and not expected to live more than a short time at best."

"A dutiful son."

It was well after dark when they reached Delera. The road came down a steep grade to the town. Halfway down it, they stopped to let Brother Boris get off. The monastery was set in the hillside above the road and it made a dark looming shape against the clouds. There was a lane leading up from the road.

"Thank you very much for the ride," Brother Boris said. "It has

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been a pleasure to meet you, Mr. Tansman, and you, Garth. Perhaps I'll stop at your store one of these days and say hello."

As they drove away, Garth said, "He's a canny one, isn't he?"

"He's not usual. Will he come to the store?"

"Aye, and you'd best be on your mark, too," Garth said, laughing. "When a Questryman is about, that's the time to mind the tight and tender."

Rilke's store was a low adobe structure, one story in the front, two stories in the middle, one story with a patio on top in the rear. Behind it, along the back of the lot, was a warehouse-*cum*-stable, also of adobe. Both store and warehouse were closely hemmed by similar buildings like piled blocks. The street was quiet except for a dog who barked and played tag with the horses' hoofs. They swung in beside the store and the dog, apparently self-satisfied, fell away. There were lights upstairs and down in the center of the building. Garth pulled in by a door that opened on the alley.

"Hop on down," Garth said. "I'll see to the horses."

Tansman grabbed his bag and stepped down. There was a figure in the doorway, holding a lamp. Garth and the wagon rattled on and Tansman looked up. The man in the doorway was no more than his height, even with the advantage of being a step higher. He had a narrow-chinned face and long wispy hair, and an unhealthy look in the lamp's glow.

"Rilke?" Tansman said, starting forward, his wagon-befuddled bones somewhat unsteady.

"Tansman."

They shook hands and Rilke said, "Come on inside. I imagine you're hungry."

A curtain separated the living quarters from the store in front. Tansman got a glimpse of silhouetted things hanging from the ceiling as he passed. While he was putting his bag in the spare, dimly-lit room upstairs, he could hear Rilke busying himself in the kitchen. He came down the stairs, passed through the sitting room and into the kitchen. Then he sat at the table and observed Rilke as he stirred a hanging kettle over the open fire.

Rilke said, "I don't suppose you know how to cook. Garth will come in and do for you while I'm gone." His tone was short, and he didn't look at Tansman.

Tansman saw now why Rilke was supposed to be his uncle, rather than a relative of the same generation. He looked both tired and sick. His hair was sparse and seemed to have only a tenuous connection with his head. His color was bad and his skin papery. His fourteen years here seemed to have taken a considerable price from him. No one, either from the Ship or from Zebulon, would have thought Rilke and Tansman to be of the same age.

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Tansman said, "What is a Questryman?"

Rilke swung around, serving spoon in hand. "What's this?"

"Apparently we gave one a ride most of the way here. I gather they are something other than common friars."

"Yes," Rilke said, turning back. "They're the bright ones, who keep the rest of them in order and the people orthodox. You shouldn't have to worry. All of our books have been checked by them and given an overmark and the rest of the stock is completely innocuous. Any questions you have about the store, Garth will answer."

"If things are so innocent and Garth can handle everything, why am I here?"

"I'll show you the things that aren't innocent. They're locked away upstairs. Your real business is just to see that they stay locked and hidden. That's all. Here." He handed Tansman a plate of unappetizing stew and poured two cups of hot dark beverage.

Tansman lifted his fork and gingerly tested his stew. Then carefully he took the smallest bit onto his fork. Just as carefully, he took the bite and found it not as bad as he feared, though not so good as he might have wished.

He swallowed and said, "They were burning bodies in the town square in North Hill."

"The megrim, I suppose?"

"Yes."

Rilke thoughtfully sipped his drink. Tansman tried his and found it bitter and undrinkable. He hastily put it down and took another bite of stew.

"I hadn't counted on that. Well, if they're burning bodies in North Hill, you can expect they'll be burning them here within two weeks. You needn't worry. You're safe. All you have to do is sit it out until I get back."

Rilke fell silent again. After five minutes, Tansman, nearly done with his stew, said, "You know, I'm not one of your Group."

"I know," Rilke said, the constant slightly hostile note in his voice evident.

"All I'm doing is sitting in your chair for a month. I have no stake in what you do. It seems to me, though, that it might be a little more to the point if you made an effort to cure or prevent the megrim instead of sitting safe through epidemics with whatever it is that you do."

"I'll bet you don't know anything about art, but you know what you like," Rilke said.

"What?"

"Never mind. If we tried curing the megrim, we'd have the Questrymen down on us in no time. We have to be careful. Garth has worked for me for thirteen years, but if he thought I was from a Ship for even a moment, he'd be off to the monastery as fast as he could run, scared to death and looking for help."

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"So you just sit," Tansman said.

"It's a choice between doing nothing and doing what we can. We do what we can."

"You mean you have faith that your paternal good works actually do more good than harm?"

Rilke visibly controlled himself. Finally he said, "Something like that."

Tansman finished his plate and as much of the drink that passed for coffee as he could choke down. "Is Old Garth the only person who works for you?"

Rilke turned on him sharply. "You want to know why I'm here? I'll tell you. The fact of the matter is that 'Old Garth' is five years younger than I am. He's had a life five times as hard as I have and he'll be dead a good sight sooner. There's no good reason for it, either, except that I was luckier than he was. Anything that I can do to even things out, I'll do."

"You must be joking," Tansman said. "He couldn't be five years younger than you."

Rilke picked up his plate. "You'd better go to bed. You've had a hard trip. Tomorrow morning I'll show you everything, and then I can leave."

As Tansman passed through the sitting room to the stairs, the outer door opened and Garth came in dusting his hands, his old monkey face savoring the smell of food.

"Well, lad," he said. "All squared away?"

Tansman stopped with a foot on the stairs and looked at him. "Yes, thank you," he said after a moment and started up.

II

Tansman helped Garth wrestle barrels off the porch and inside the store, impelled by Garth's assurance that rain was not more than a half hour away. As he worked, Tansman thought about the essence of being away from home. It was, he decided, discomfort.

You could set the discomforts in a list: unregulated weather, mostly cold and wet; mud; filth; odor; insects; noise; bad food, and certainly an unhealthy diet; an uncomfortable bed to sleep on. Subtler things: no one to talk frankly to with Rilke gone now for a full week. No one to talk to at all, really, on any subject of interest to him. Nothing to read, either, except encyclopedia distillates couched in mystical terms or books like "The Secret of the Ships" that purported to tell all and in reality told nothing, but simply hoped to temper prejudice slightly by substituting gray lies for black ones. Nothing to read by except an eye-straining oil lamp.

There is a comfort in being in your own place, knowing that life has a pattern to it. Knowing what is expected and what to expect. Let the primitive nature of Zebulon go, there is a basic discomfort in being in a strange place. Strange-

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ness in itself is a discomfort. Tansman didn't mark the passage of days on a calendar, but he well knew how many had passed and how many more he had to wait.

As they worked, Brother Boris came down the boardwalk toward them. Tansman looked up from fitting a lid on a pickle barrel to find him at his elbow looking more florid and less certain than Tansman remembered.

"As I promised, Mr. Tansman," he said, "I've come to look at your store."

"My uncle's store. Is this a friendly call, or in your official capacity?"

"I trust I am always friendly," Brother Boris said sharply, and shook his head as though trying to clear it. There was sweat on his forehead.

"Are you feeling well?"

"Quite well, thank you."

"Well, if you will wait inside for a minute," Tansman said, "I'll be with you as soon as I'm done here." He banged the lid home.

Garth came out of the store as Tansman began rolling the pickle barrel on its lower rim toward the door. Tansman stopped and looked back at the half-cleared porch.

"Finish up here, will you?" he said. "I'm going to serve the brother."

"He don't seem quite the same man today," Garth said. "He wasn't above half civil."

"I don't believe he's feeling well."

"Oh."

Tansman wheeled the barrel across the store floor and slammed it into place beside its fellows. There were shelves on both sides of the store and against the back wall, with counters in front. The main floor of the store was crowded with racks and tables and strings of hanging goods. It looked at first to be a hodgepodge, but Tansman had gradually learned that first there was a system in the store and then learned the system itself.

Brother Boris was standing at the small rack of books that was one of the store's principal reasons for being, for all that the books were few in number and not conspicuously displayed. He was holding one of the books and looking through it. There was no one else in the store. With the storm clouds outside gathering and the season of the year determining an early dusk—an involved matter that Tansman, never having had to live with the problem, had never completely understood—the interior of the store was dim. The hanging lamps would have to be lit soon.

Brother Boris looked across the store and said, "I will not be stayed. I will not be stayed." His tone was almost preoccupied.

"Brother?"

"I will go into the town today. I will not be stayed. There *is* evil here and it must be searched out. Would you keep me from my purposes? Look to yourself, Brother—the ef-

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fect bespeaks the cause. You jeopardize yourself."

The brother's words were disconcerting to Tansman, not because they applied to him, but because he was sure they didn't. Brother Boris was talking to himself or to someone who wasn't there and his tone was becoming agitated.

Tansman crossed the store as quickly as he could, threading his way. He knocked a basket off a table and it bounced on the floor, but he didn't stop to pick it up.

"Brother, are you all right?"

Brother Boris turned toward him, his eyes focusing. There were even more beads of sweat on his forehead.

"Are you a communicant of the Confraternity?"

That was a rhetorical question. Tansman lied and said, "Yes."

Brother Boris held up the book in his hand. Tansman saw that it was one of the three copies the store had of "The Secret of the Ships." Brother Boris pawed at the table with his other hand for support.

The brother said, his voice slightly out of control: "If you love the Confraternity, why do you peddle this filth? Evil is corrupting. Is profit all that is important to you?"

"That book has the personal overmark of Bishop Rafael."

"He doesn't know."

The bell suspended over the front door tinged as Garth rolled a barrel in. Brother Boris' voice trailed off as he raised a shaky hand to his forehead. The book in his left hand dropped to the floor.

"I *see* the evil and I know it," Brother Boris said. "But my head—why does it not . . . stop . . . moving?"

Tansman stepped forward, calling to Garth, as the friar's knees unlocked and he began to slump to the floor. Tansman caught the brother and began to wrestle his limp body, much as he had wrestled the barrel. Brother Boris' sleeve slid up his arm to show a purple patch of hemorrhaged blood vessels. Tansman heaved him behind the counter and onto the stool there. Garth had come forward when Tansman had called to him and he had seen the friar falling, but he stayed on the other side of the counter.

"Is it the megrim?" he asked.

Tansman nodded. "I think it is. Go hitch the wagon and we'll carry him up to the monastery."

Old Garth left immediately, through the curtain to the house behind and out through the side door. It was some minutes before he came back, and he was cautious in approaching.

"Come on," Tansman said. "Help me get him out to the wagon."

Garth said, "Please. I'd rather not."

"I can't move him by myself."

"No, sir. But I'm scared. I'm old, I know, but I don't want to die, and I especial don't want to die of the megrim. Look at him."

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Garth pointed at Brother Boris. He was writhing in obvious pain, his jaw clenched, his face bright red and sweating, veins standing out. Tansman had to hold him down.

Tansman said, "But the megrim is here in Delera and you can't avoid it. You're just going to have to take your chances. Just help me get him to the wagon. You drive and I'll hold him down. That is all I'll ask of you."

All the usual quick bounce and vigor was gone from Garth. It was apparent, however, that Brother Boris could not stay where he was. Reluctantly and apprehensively, Garth helped Tansman move him out to the wagon. Perhaps he had hoped that the megrim would pass them by here in Delera. Perhaps he had such scanty notions of the disease as to think the appearance of the megrim a purely accidental thing, determined by the moons or the comparative uprightness of a town. Or perhaps he had not thought at all. For obvious reasons —their relative positions, and the possibility of an accidently betrayed ignorance—Tansman hadn't discussed the situation with him, but it was clearly evident that Garth was unprepared for the megrim to strike and that he was scared to death of catching it himself.

In any case, it wasn't: "Now, lad." It was "Yes, Mr. Tansman." It was unwonted quietness and reserve. It was an uncharacteristic respect for the young dandy nephew with such apparent lack of fear in dealing with the sweating, raving, purple-blotched pile of meat that was Brother Boris.

Brother Boris was loaded, Tansman handling the arms, Garth the feet, into the wagon standing in the alley by the side door. Garth mounted to the seat and whistled the horses into motion.

They charged into the street and up the hill. The monastery, set into the hill, dominated the town below, seeming a dark fortress with the wind rising and the heavy clouds riding overhead. It took five minutes to reach the lane that wound up from the main road to the monastery. When they reached the main gate there was a friar there to open in response to Garth's shouts.

The court of the monastery was unmortared brick and they clattered in. A brother came out to meet them.

"What is it that you wish?" he asked as the wagon swung in beside him.

"It's Brother Boris."

"Brother Boris?"

"Yes. He's ill. My name is Tansman. He collapsed in my uncle's store."

"He was determined to go to town today, but I thought he had been . . . restrained. He wasn't at all well this morning."

"It's the megrim," Tansman said.

"Yes, I know. Brother Boris is the third in the monastery. I'm told by the good doctor that there has

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been a case in town. I believe the abbot may close the gates."

The brother had waved two younger brothers to the wagon as he talked, and they carried Brother Boris inside.

On the way down the hill again, Tansman said to Garth, "I think we'd best close the store temporarily."

Standing on the patio in the evening air near the stair that went down to the alley, Tansman could not see the fire that had been built in the afternoon, but he could smell it. He was more of an outsider than anyone in the town dreamed, but he'd been asked his advice and he had voted for burning. It was, as he knew, far more of a preventive measure than mass burial, though no real solution, of course, to the basic problems of sanitation that lay behind the regular appearance of the megrim.

The buildings all around him were silent and dark, shuttered against the great unknown. The smell of the fire had been penetrating, reaching him even within his closed room, but it was much stronger here in the open air. Tansman couldn't help but wonder if he would grow used to it. The night held no noise but one, and that briefly—the neighborhood problem dog who went skittering and yelping through the alley below and then was gone, pursuing a great unknown of his own.

A diffident rapping noise recalled his attention and he turned to see Garth standing in his doorway.

"I called up, lad, but you didn't answer."

"Did you want to see me about something?"

"Yes, sir."

Tansman nodded and came inside, closing the door behind him. Little old Garth, head reaching only to Tansman's shoulder, a bit nervous, stood waiting.

"Mr. Tansman, you won't be wanting me tomorrow, will you?"

"No, I don't think so."

"Will you be needing the wagon?"

"No."

Garth's manner was distinctly nervous and uncertain, but he seemed to have a distinct end in mind. Tansman waited for him to come to it.

"They need someone to haul for the fire. I said I'd do. I know it was presuming, but I thought Mr. Rilke would say it was all right."

"It's all right," Tansman said, "but are you sure you want to do it?"

Garth held out his hand. It was rough-backed and corded, and it was trembling.

"I'm scared," he said. "I don't deny it. But it's what you said the other day. Somebody has got to do it, and when they asked me I said I would. I don't want to die, but I thought better me who's had my life than somebody young, a boy like you who hasn't had any life to speak of yet."

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Tansman didn't comment. He just said in a harsh voice, "Go ahead if you want." And then he turned away.

III

The front of the store was dark, the night was close and secret. There was a single oil lamp lit in the sitting room and Tansman tried desultorily to read. He found it hard to concentrate. The book was dull and ludicrous and his mind was unsettled. He hadn't heard from Garth since the morning he'd left with the wagon. He didn't know where Garth was sleeping or eating. He was, in all truth, worried.

At this particular moment Tansman had no great taste for life. Under no circumstances could he have wished to be a Zebulonite, ignorant, superstitious, wretched and short-lived. That would have been like cutting out two-thirds of his mind. But the only other choice meant automatic guilt. He'd led a quiet life and never, as far as he knew, done any damage to anybody. He had, in fact, added some small bits of knowledge to the human store, possibly added some years to the human lifetime. But simply to know what things were like here and that elsewhere there was an easier, simpler life, and to live that life was to be guilty.

He didn't know how Rilke looked at what he did, but to his mind there was no less guilt in doing to people for their own good what you thought best, particularly since that "best" was severely tempered. The book he was reading, "All-Purpose Household Hints and Medica," had an entry for megrim. A lie. Under *treatment,* it said, "Supportive care." That, honestly translated, meant, "Put a blanket over him. Feed him as much as he will eat. He'll either die or he won't."

Knowing better, you could prevent or cure, and that was a decision for which you were responsible. But knowing better, if you did nothing, that was a decision, too, for which you were no less responsible. Tansman could not help envying Garth whose decisions were simple. The consequences of Garth's actions could clearly be foreseen. Hell was not knowing whether what you did was right or wrong, but still having to make a decision and live with it. He wished he were anywhere but here.

He was roused from his book late in the evening by a noise in the alley, the noise of the wagon stopping. He snatched up the lamp and hurried to the door. The air was cool outside. The horses, well-trained, were standing quietly in their traces. The wagon was hauled up by the door. Garth was sitting on the seat, the lines in his hand, his eyes shut. There was vomit on the front of the wagon, yellow streaks. Garth weaved noticeably on the stock-still wagon box.

He turned to Tansman and said

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with care, "I'm . . . sick." Then he fell forward on his face.

Tansman took him inside and cleaned him up. Garth's own quarters were a sleeping mat and little more in a small room off the warehouse and stables. There was no question of taking him there, so Tansman carried him upstairs and put him in his own bed, throwing his clothes in the corner.

Then Tansman went outdoors to tend to the wagon and horses. As he was rubbing the horses down, his motions were automatic, his mind on other things. He had a decision to make, just as before, because, after all, the consequences of Garth's actions had been foreseeable. His mind told him there was a decision to make, but for all the mulling ahead he did know now what he was going to do.

Garth's little gnarled body thrashed uneasily under the blankets Tansman had covered him with and brought Tansman awake in his chair. The lamp was low as he had left it, and he turned it up and carried it close to the bed.

Garth was mumbling and moaning to himself. Tansman reached over to touch his forehead. It was feverish, as before, but possibly a bit cooler. Tansman fetched broth that he had had simmering over the fire and spooned it down Garth's throat. Garth swallowed, but his eyes did not open.

Now it was afternoon and there was sun outside, but Tansman kept the windows covered and the light was just a glow on the walls of the room. It was time to give Garth another injection. As Tansman bent over, Garth's eyes did come open to look blankly at Tansman. Tansman didn't stop. He slid Garth's sleeve up, placed the blunt tip against Garth's arm, held the faintly-blotched arm steady, and pressed the button. Then he turned away and replaced the injector in his little medical kit. When he looked again at Garth, his eyes were closed.

On the third day, as Tansman fed him broth, Garth's eyes were open again and focused. It was evening again. The spoon clinked against his teeth as he tried to speak.

Finally he said, "You're a shippeen, aren't you?" There was no real question in his voice.

Tansman said, "Yes," and lifted the spoon again.

Garth didn't say anything more, but simply continued to eat until the bowl was empty. Tansman took it downstairs and filled another for himself. He sagged a little as he sat at the table and ate. He'd had little sleep for days, and the sleep that he had had was in a chair, and he was tired. The soup was poor—he had made it himself with the advice of one of Rilke's books, and either the advice was bad or, more likely, the gods had not intended him to be a soup maker—but nonetheless there was a certain satisfaction in it. It was hot and stomach-filling.

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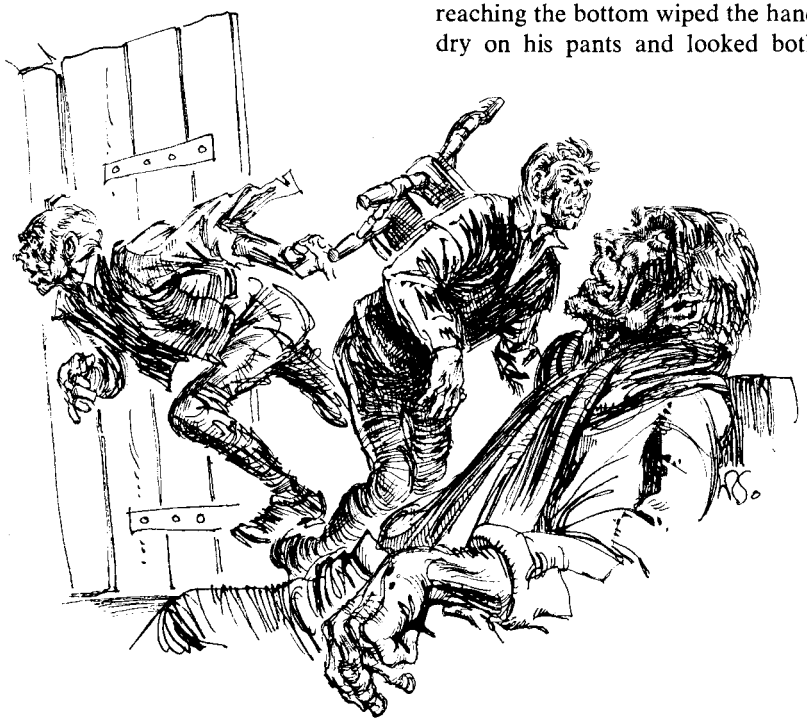
The lamp was out when he went upstairs and there was a chill in the air. He lit the lamp and turned to find the bed empty, and Garth and his clothes gone. Suddenly he felt frightened. He hadn't really expected this and he hadn't expected Garth to have the strength to move. He was struck that a man could fear him so, and frightened of what Garth might do.

He looked around the room. Not the stairs—he'd been facing them in the kitchen and he'd have seen. He felt the cooler air he had sensed when he entered the room and looked toward the door to the patio. There was the stair from the patio to the alley. He took a deep breath and followed a shadow.

The air on the patio was damp. There was a film of wetness under Tansman's feet. The smell of the eternal fire hung heavily over all, a smell that only the sun would bake out long after this time of death and suffering. Tansman shivered in the cool of the late evening. He went down the uncertain stairs to the alley, hand on the railing, and reaching the bottom wiped the hand dry on his pants and looked both



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ways. There was no one in sight and the fading light gleamed faintly on the wet cobbles. The back of the alley was blocked by the warehouse and the buildings that abutted on the adjacent street, so Tansman took a chance and went in the other direction, toward the front of the store and the main street.

Halfway there, running, he stopped and turned back, caught by the half-open door in the adobe building that formed the other side of the alley. He hesitated and then he entered. The door entered on stairs up and stairs down. Tansman wasn't sure, but he thought he heard the mumble of voices from above, so he went up the stairs wondering that he might be going only farther and farther afield.

But he knew he wasn't when he got to the top of the stairs. Through the door he could clearly distinguish Garth's voice. He lifted the latch and opened the door. The room was dark, but he got the impression of a family circle, one lying down and two sitting, with Garth standing in front and addressing them.

Garth turned to see him as he entered the room, fear evident in his face. Garth said nothing, but almost desperately summoned strength and lifted the wooden chair that stood between them, then brought it down over the shoulders of an unprepared Tansman. Tansman had seen two hundred years of dramatic entertainment at home in the Ship in which chairs and people were brought violently together. In every single one of them, the chair broke and the person didn't. This chair didn't break. This chair was made of heavy, solid wood, handpegged, designed to be sat upon by generation after generation without breaking. Tansman was knocked solidly to the floor. Garth dropped the chair and ran in terror past him out the door.

The breath was knocked out of Tansman's lungs. He had tensed just as the chair struck him, exactly the wrong thing to do, and his back and neck were severely wrenched. His head ached. Coughing, he pushed himself up to elbows and knees as Garth went down the stairs.

Through all this the other three in the room had not moved. Wonderingly, Tansman looked at them through the gloom. The man in the chair nearest him grinned hollowly back at him, and then Tansman saw that all three were dead and that the stink of rotting, rather than burning, death permeated the room. Dead for who knew how many days and no one had yet discovered it and added their bodies to the death wagons. Garth's mind was evidently so befuddled that he hadn't even realized it.

Tansman dragged himself to his feet and lurched down the stairs. Halfway down, he stopped and coughed again, trying to get his

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breath. Garth was at the corner when he reached the alley, turning left, and he tried to run, but slipped on the wet cobbles and went skidding headlong. He picked himself up and followed Garth, limping on a banged knee and coughing.

When he reached the road he looked left to see Garth at the base of the hill where the cobblestones turned to dirt and the road began to climb toward the monastery. The last light, except for three risen moons, had gone, but he could just make out Garth who was moving as rockily as he. The monastery showed in what direction Garth's mind lay. Tansman followed.

The road reached to the right as it rose, and the lane to the monastery switched back to the last three-quarters of the way up. Garth left the road at the base of the hill and moved nearly straight up the hillside. When Tansman got there he saw that there was a footpath.

He stumbled and scrambled, concentrating on climbing. The main thought was catching Garth before he reached the monastery, but the thought was lost in the darkness, the wet earth of the path, the slope, the stones that moved under his feet, the struggle to climb and climb as fast as he could. All of a sudden there was a level place where the path moved around a shoulder of the hill before climbing again. Tansman took a long shuddering breath of cold black air and then stopped and listened, but heard nothing. He didn't hesitate, but moved on, following the path.

Then he was struck again, this time not by a chair but by a body waiting on the hill just above the path. Garth landed on his shoulders and toppled him over, and he went off the edge of the path. He felt a jabbing pain in his ribs and knew that he had been stabbed. Tansman tried for balance as he was knocked forward, but his foot twisted in the soft earth and he fell backwards, landing on his side half on the path edge. Garth, who was holding on to him for purchase and whose knife was occupied, landed heavily.

Garth's grip relaxed and Tansman rolled away. They both rose slowly, facing each other.

"Damned shippeen," Garth gasped as Tansman launched himself forward.

Tansman grasped for Garth's left hand, his knife hand, and hit him full body at the same time. The knife sliced his arm, but Garth's knees buckled and he fell with Tansman on top. Tansman held on to Garth's left arm through his own pain; his superior weight and strength gave him the advantage. The arm was pinned down to the ground where Garth could not use it. Tansman brought his left knee up to slam into Garth's ribs. Garth lost his breath with an abrupt and audible *whoof*. Tansman then bore down on Garth's knife arm with one hand and brought the other over to wrench the knife away.

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Garth tried to struggle loose, heaving his body, but Tansman kept his weight solidly on top. He took the knife awkwardly in his left hand and jammed it into Garth's side. Garth made a little cry and then went limp.

Tansman rolled away and then came to his feet. Struggling for breath, with banged knee, twisted ankle, aching back and head, and two knife wounds, he limped down the path and then fell to the ground again. He drew a heavy breath, choked on it, and then just lay there, breathing.

When he was in control of himself again, he found he was still holding the knife in his hand. He wiped it in the dirt of the path, not knowing why he did it, and then threw it as far away as he could. Finally he came to his feet and moved back to the place that he had left Garth's body.

The body wasn't there. Tansman felt the fear rise again.

He shook his head and then started along the path. After a little distance he could see the snail marks Garth had left in dragging himself.

He came on Garth's crooked body moving along the path as he limped after. He laid hands on it to stop it, but when he let go the body moved ahead again. He struck it, but still it moved. At last, Tansman picked a muddy rock out of the hillside. It was just hand-sized. He struck Garth in the side of the head with it until he lay still and the rock was bloody. Then he threw the rock away and rolled the body over.

Garth's head was bloody and his cheek broken. His left eye was no longer contained in the socket, but hung loose. Tansman gently touched the broken face and cried. Garth lay limp and silent. This was not what Tansman had ever wanted.

Finally Tansman knew what he had to do. He put the body on his shoulders and started down toward the town again. He found it hard going and moved slowly. Twice he set the body down in the mud while he caught his breath and rested his aching shoulders.

He walked straight down the main street, but the street was empty. There were no lights on the main street, just the glow of the fire down at the far end. Shutters were closed. Then the problem dog came shooting out from between two houses to sniff and snap at the ankles and yap. Finally the dog fell away.

After that, Tansman stopped and put the body down again while he rested. The pain in his side was intense and his right arm was caked with blood. He made a perfect creature of the night, covered with both his own and Garth's blood. His mind was cloudy and then he was caught by a noise of pain.

He turned to see Garth moving,

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his mouth making a noise of pain so intense that it could be only half-uttered, his hand reaching up as Tansman's had done to touch his broken face.

Tansman made an inarticulate cry. Then, tears of pain and pity in his eyes, he killed Garth for the third time. He put his hands around Garth's neck, and knowing what he did and acting deliberately, he broke the neck. It took an effort, and he felt it give at last under his hands.

After another while he loaded Garth back onto his shoulders and staggered on down the street. The fire was low and unattended, but the remains of its fuel could still be seen. Tansman ignored the smell. He added wood from the pile that stood at hand until the fire blazed up again, and then he added Garth's belated body. Tansman stood watching it burn and cried for both of them.

IV

Tansman made his way down the hill from the monastery. The air was cool but the sun was bright. From the path you could see the whole town, wagons, horses, people moving, shadows from an occasional cloud sweeping across like a sea wave. Tansman had taken Brother Boris some fruit. The brother had been pleased both by the fruit and by the visit, and he had summoned enough of the little wit remaining to him to gurgle, smile and wave. That had been some satisfaction to Tansman.

He returned to the closed store to find Rilke there, patiently waiting for him.

"Are you back now?"

Rilke said, "Yes." And he said that he was feeling much better now. He was looking better now, too, more like an older brother than an uncle. His color was stronger, his hair less wispy.

They talked for some minutes on inconsequential subjects, and then Rilke, looking around, asked where Garth was.

Slowly Tansman said, "You remember the megrim? He died of the megrim."

Tansman remained one last night and then returned to the Ship. He stayed there for three months, trying to re-busy himself with his former life. Finally, he went to see Nancy Poate one day and came back at last to Zebulon.

He wasn't happy and he had no certainty of the rightness of what he was to do. But he was willing to live with the consequences, whatever they turned out to be. That's all he could ask.

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Concluding a two-part article on the problems of guerrilla—or "brush-fire"—warfare. The object of the dissident guerrilla group is to force the peaceful, fairly satisfied majority of a population to accept the guerrilla group's philosophy of government. If they were a majority, they wouldn't have to use force. Basically, the problem is the old problem of Cops and Racketeers—only larger and deadlier!

Challenge

Insurgent vs. Counterinsurgent

JOE POYER

Political Operations in Counterinsurgency

To be successful, counterinsurgency operations must be conducted within the framework of a national plan and only one factor of the plan can be the defeat of the insurgents. The insurgents base their appeal to the population on the desire for reform. It then becomes axiomatic that to defeat an insurgent movement, the government must move to correct the conditions that created the environment for the insurgency.

The specifics that cause the insurgency conditions will vary from country to country and so no one sweeping plan can be put into effect, as we have discovered time and time again in the Philippines, Laos, Viet Nam, Cuba, et cetera. Naturally, the more obvious abuses will always be found in civil servants, police, military, landlordism, et cetera. Any or a combination of abuses may be present at one time. But, by correcting abuses, the government deprives the insurgents of sympathy.

The government must move to isolate the people from the insurgents—no mean feat when the guerrilla is able to move freely through the countryside. The British "protected villages," President Diem's "agrovilles," and the regroupings of the Algerians by the French, all were efforts to insulate the population. The forced or voluntary regroupings may improve the chances for successful counterinsurgent operations, but they gain nothing in good will from the people involved. In South Viet Nam, for instance, where ancestor worship is part of the national religion and is particularly strong with the rural peasantry, the forced regroupings into protected villages often meant that the peasant had to leave his ancestral home—to him this meant actually leaving his ances-

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tors. Reaction to and rejection of the plan was inevitable.

Education programs involving the peasant as an active participant can instill in him the rudiments of national feeling and are much better in the long view. Additionally, using such a system, you not only isolate the insurgent, but you identify him as the one individual unwilling to take part in the program. Of course, then you have to protect the teacher and the village, but the individual—whose support you need in the long run—is much happier with you.

The second aspect of a national framework, is the development of a unified intelligence system with the peasant as an active participant. Such a system played a crucial part in overcoming the Huks in the Philippines. Agents were infiltrated into or won over from within the Huk ranks and the government succeeded in locating the Communist Party's central headquarters and records and in capturing some of the top leaders. The headquarters, by the way, proved to be in downtown Manila.

Nationwide programs can be implemented only with great difficulty in contended areas. Naturally, these are the areas in which the intelligence system is the most needed.

The standards the Communists set for themselves are illustrated by the Chinese Communist General, P'eng Teh-huai: "Ideally, every peasant should be on the partisans' intelligence staff, so that it is impossible for the enemy to take a step without the partisans knowing it." [8]

It is an axiom of counterinsurgency warfare that no territory is really secure until it has been rid of insurgents, the insurgents' support has been neutralized, and/or eliminated, and a government basis of support has been won. Merely making the insurgents run will not do the trick as they will only "fight again another day."

Just as the insurgent activities are geographically related, government plans and actions need to be phased to provide for the creation and extension of secure areas. Operations should be planned so that the means used to secure the areas are mutually supporting—operations in one area support the operations in another. Government forces should be maintained in the area until each of the above three tasks are completed. Only then should they be released for operations elsewhere. Then, they should always be followed by government civilians to take up the work the military has begun and complete the reforms needed to see that no basis for insurgency remains.

The government should always have as its goal standards of popular support no lower than those of the insurgents.

In conventional warfare, the military aspects are given the greatest

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priority. In insurgency warfare, the emphasis should be equally on military and nonmilitary. The counterinsurgency operations are neither exclusively the area of the *military or the political officer*. Although conditions in a given area will vary greatly, generalizations are possible, although should never be adhered to strictly if a better way of accomplishing a given end is available. "The longer an action is delayed, the harder the cure." A trite axiom, but true nevertheless. If the reforms are delayed too long, the insurgents may claim credit for prompting them—as in Colombia today and Cuba in the late 1950's. In the stage where the insurgents are just beginning to establish themselves, effective police action may be sufficient. But once the insurgents begin operating tactically, tactically trained military units will be needed to suppress them. If insurgent operations have succeeded to a point where the government forces cannot operate effectively in the contested area without being spread too thin, it then becomes necessary to extend pacification efforts outward—to hit the fringes, in other words, and work in.

Political indoctrination for counterinsurgent troops is especially important. The government cannot risk putting apolitical combat troops against politically motivated insurgents. Political instruction must also be given to the civilians in the area to offset the instruction and possible damage accomplished by the insurgents. The military troops operating in the specific area must do all that they can to assure the civilian population that they are there in their best interest. They must, wherever possible, take part in local civic projects. They should initiate projects on their own, such as supplying medical aid and services if there are none in the particular locale. They must help and take an active interest in the life of the community such as the gathering of crops, building of houses and shelters, community centers, et cetera. They must truly show themselves as friends of the civilian population. They must seek to instill in the civilian population a sense of nationalism or nationhood—a rapport with the government.

The Future Development of Counterinsurgency

A glance backwards into recorded history shows that insurgency warfare is one of the oldest forms of military action undertaken by man. There are recorded accounts of Egyptian forces using counter-guerrilla tactics to defeat Nubian raiders along the upper reaches of the Nile. The Greeks developed guerrilla-like tactics which they employed against the Persians in Asia Minor. Hannibal waged a ten-year guerrilla campaign in the Italian peninsula against the Romans, and Spartacus readied his slave forces to

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defeat Roman Legions by accomplishing basically the three precepts of Mao Tse-Tung. DuGuesclin, Constable of France, convinced that French Knights in heavy armor could never defeat English longbowmen, turned from mass cavalry attacks to raiding English forces. He simply made it too costly for the English to stay on the Continent, and they gradually lost, or gave up, most of what they had previously held, or had gained, and the Hundred Years War ended with the "guerrilla" the victor. And so it goes up to the present day.

It has taken perhaps three thousand years and some of the most modern military equipment available today for the counterinsurgent to finally meet the insurgent on his own terms. But, that is all the counterinsurgent can do as of today.

There are a good many facets to the scientific conduct of counterinsurgency operations that have not been examined by the various military and scientific bodies that deal with the subject. In a few of these areas, some work is being done, but it is generally considered "Buck Rogerish" in nature and better limited to the pages of science fiction. Too many people in the scientific and military disciplines are prone to categorize and ignore work that needs to be done because it is beyond their present conceptions. But, they are learning slowly.

It has been said that the next big forward step in counterinsurgency warfare will be the use of instrumentation techniques to detect and locate the insurgent. If used properly, instrumentation will provide the counterinsurgent with a detection method(s) to locate the insurgent, whether waiting in ambush, moving along a carefully hidden trail, gathered at his headquarters and rest areas, and even during his "off-hours" at home in his village.

Several instrument techniques already exist for detecting "hostiles" in heavily jungled terrain—in fact, they are being used in a great variety of applications from hospital clinical laboratories to monitoring the contamination loading in manned spacecraft cabins. These instruments would require very little development to turn them into counterinsurgency weapons of great value.

Work has been done in establishing the concentrations of harmful chemicals in both spacecraft and underwater vehicles that would be particularly valuable to the counterinsurgent. As an example, Dr. Thomas B. Weber, of Beckman Instruments, Inc. has cataloged all of the effluents—chemical and particulate that are emitted by man.[9] He has found that there are over four hundred chemicals produced by the normal human metabolic processes that are generated by the body every second of its existence, Figure 15.

This research was performed primarily for contamination system

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definition for manned spacecraft during the extended missions that are being planned for the Manned Orbiting Laboratory, Lunar and Planetary bases, and long-term space exploration missions, but a good deal of it is applicable to instrumentation for counterinsurgency warfare. The principal concern here is the "trace constituents" that are generated in the sealed and limited atmosphere of a spacecraft. Dr. Weber discovered that unless sufficient steps are taken to safeguard against these effluents, the astronaut is, literally, liable to poison himself with his own body wastes.

These same trace contaminants produced by the human body are

THE EFFLUENTS OF MAN AND THEIR SOURCES

FIGURE 15. *The Effluents of Man are chemical substances that are emitted by man in the course of his natural body functions. Dr. Thomas B. Weber of Beckman Instruments, Inc., Fullerton, California has cataloged over 400 different chemicals. Of these 400, some twenty are emitted in sufficient quantity to be easily detectable.*

* *O-oral/F-fecal/D-dermal/U-urinary*

COMPOUND	SOURCE*	COMPOUND	SOURCE*
acetaldehyde	D,F,O,U	*aldolase*	O
acetamide	D	*aldosterone*	U
acetic acid	D, O	*alkaline phosphatase*	O
acetic anhydride	D	*allantoin*	U
acetoacetic acid	F,O,U	*allyl alcohol*	D
acetone	D,F,O,U	*aluminum*	D,F, U
acetonitrile	D, O	*aminobenzoic acid*	D,F, U
acetophenone	D	*aminobutyric acid*	D,F
acetylacetone	D, O	*aminoisobutyric acid*	D,F
acetylchloride	D	*aminophenol*	D
acetylcholine	D, O	*ammonia*	D,F,O,U
acetylene	D	*ammonium sulfate*	O,U
acetylglucosamine	O	*amyl acetate*	D
acetylnitrate	D	*amyl alcohol*	D
acetylurea	D, U	*amylase*	F,O,U
acid phosphatase	O,U	*androsterone*	U
acrolein	D	*aniline*	D
acrylic acid	D	*arabinose*	D, O
adenine	D, U	*arachidic acid*	D
alanine	D,F,O,U	*arginine*	D,F,O,U

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arsenic	F,O,U	*chloroprene*	D
ascorbic acid	O,U	*cholecalciferol*	F, U
aspartic acid	D,F,O,U	*cholesterol*	D,F,O,U
barium	O	*cholic acid*	D,F
benzalacetone	D	*choline*	D,F,O,U
benzene	D	*cholinesterase*	O,U
benzoic acid	D,F, U	*chromium*	U
benzyl alcohol	D,F, U	*cinnamic acid*	D,F
benzyl chloride	D,F	*citrulline*	U
benzylamine	D	*cobalt*	F,O
bilifuscin	F	*copper*	D,F,O,U
bilirubin	D,F, U	*coprostanol*	F
biliverdin	F	*creatinine*	D,F,O,U
biotin	F,O,U	*coproporphyin I and III*	F, U
boron	F,O	*cyanamide*	D,F, U
bromine	D,F, U	*cyanic acid*	D, U
butyl acetate	F	*cyanocobalamine*	F,O,U
butyl formate	D	*cyclopropane*	D
butyraldehyde	D,F,O	*cyclohexyl amine*	F
butyric acid	D,F, U	*cysteine*	D, U
calcium	D,F,O,U	*cystine*	D,F, U
calcium carbonate	F,O,U	*dehydroascorbic acid*	D, U
calcium phosphate	D,F,O,U	*dehydrobilirubin*	D,F
calcium sulfate	D,F	*dehydrocholesterol*	D,F, U
capric acid	D,F	*deoxycholic acid*	D,F
caproic acid	D,F	*diacetyl*	D, O,U
caprylic acid	D,F	*dizaomethane*	D
carbamic acid	D,F, U	*dichloroethylene*	D
carbamyl chloride	D	*diethyl ketone*	D, O
carbon dioxide	D, O,U	*diketogulonic acid*	O,U
carbon disulfide	D,F	*dimethylamine*	D, U
carbon monoxide	D,F,O	*dimethyl sulfide*	D, O
carbonic acid	D, O,U	*diphenylamine*	D
carbonic anhydrase	O	*epicoprostanol*	F
catalase	O	*epiguanine*	U
catechol	D,F, U	*epinephrine*	D, O,U
chloroacetone	D,F, U	*estradiol*	U
chloroacetic acid	D, U	*estriol*	U
chlorine	D,F,O,U	*estrone*	U
chlorobenzene	D	*ethane*	D, O
chlorocarbonic acid	D	*ethane thiolic acid*	D,F

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ethane sulfonyl chloride	D, U	*glucuronidase*	O
ethyl acetate	D,F	*glutamic acid*	D,F,O,U
ethyl alcohol	D,F,O,U	*glutamine*	U
ethylamine	D, O	*glutaric acid*	D
ethyl bromide	D	*glyceraldehyde*	D,F,O
ethyl butyrate	D,F	*glycerol*	D,F
ethyl carbonate	D	*glycine*	D,F,O,U
ethyl chloride	D, O	*glycoaldehyde*	D,F
ethylene	D,F	*glycolic acid*	F
ethylene chloride	D, U	*glycolic aldehyde*	D,F
ethlylene chlorohydrin	D	*glyoxal*	D
ethylene diamine	D,F	*glyoxalic acid*	D
ethylene glycol	D	*guanidine*	D,F
ethylene oxide	D	*guanine*	D,F, U
ethyl ether	D, O,U	*guanidinoacetic acid*	U
ethyl formate	D,F	*heteroxanthine*	U
ethylidene chloride	F	*hippuric acid*	U
ethyl iodide	D,F	*histamine*	F,O,U
ethyl mercaptan	D,F, U	*histidine*	D,F, U
ethyl nitrate	D,F	*hyaluronidase*	O
ethyl nitrite	D	*hydrocyanic acid*	D,F,O,U
ethyl propionate	D	*hydrogen*	D,F,O
ethyl propyl ether	D, U	*hydrogen bromide*	D, U
ethyl sulfide	D,F, U	*hydrogen chloride*	D, O,U
etiocholanolone	U	*hydrogen phosphide*	F
fluorine	D, O,U	*hydrogen sulfide*	D,F
folic acid	D, O,U	*hydroquinone*	D
folinic acid	F, U	*hydroxybutyric acid*	F, U
formaldehyde	D,F,O,U	*hydroxyproline*	D, O,U
formamide	D, O	*hydroxystearic acid*	F
formic acid	D,F, U	*hypoxanthine*	U
formic ether	D, U	*iminodiacetic acid*	O,U
formyl chloride	D	*indole*	D,F
fructose	O,U	*inositol*	D, O,U
fucose	D, O	*indoxyl potassium sulfate*	U
furan	D	*indoxylsulfuric acid*	U
galactosamine	O	*invertase*	O
galactose	D, O	*iodine*	D, O,U
gluconic acid	F,O	*iron*	D,F,O,U
glucosamine	D,F,O	*isobutyraldehyde*	D
glucose	D,F,O,U	*isocyanic acid*	D, O

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isodecanol	D	*methyl ethyl ketone*	D, O
isoleucine	D,F,O,U	*methyl formate*	F
isophthalic acid	D	*methyl iodide*	D,F
isoprene	D, O	*methyl isocyanate*	D,F, U
isopropyl acetate	D	*methyl isothiocyanate*	D,F, U
isopropyl alcohol	D, O,U	*methyl mercaptan*	D,F, U
isopropyl amine	D	*methyl nicotimamide*	U
isovaleraldehyde	D	*methyl nitrite*	D
kynurenin	F	*methyl propyl ether*	D, O,U
lactase	F	*methyl sulfide*	D,F,O
lactic acid	D,F,O,U	*methyl thiocyanate*	D, O
lauric acid	D,F	*methyl urea*	D, O,U
lead	F, U	*methyl vinyl ether*	D
leucine	D,F,O,U	*methylene chloride*	D,F
linoleic acid	F	*methylxanthine*	U
lipase	F,O,U	*molybdenum*	F, U
lithium	F,O	*mucinase*	O
lithocholitic acid	D,F	*myristic acid*	F,O
lysine	D,F,O,U	*niacin*	D,F,O,U
magnesium	D, O,U	*niacinamide*	F, U
malic acid	D	*nickel*	F,O,U
malonic acid	D	*nitric oxide*	D, O
lysozyme	O,U	*nitrobenzene*	D,F
maltase	F,O	*nitrogen*	D,F,O,U
manganese	D,F,O,U	*nitrogen dioxide*	D, O
mannose	D, O	*nitrogen hydrate*	F
margaric acid	F	*nitrogen monoxide*	D, O
mesobilirubin	F	*nitrogen oxychloride*	D, O
mesobiliviolin	F	*nitrogen tetroxide*	D
methane	D,F,O	*nitromethane*	D
methionine	D,F,O,U	*nitrophenol*	D,F
methionine sulfoxide	F, U	*nondecylic acid*	F
methyl acetamide	D	*norepinephrine*	U
methyl acetate	D,F	*nuclease*	F
methyl alcohol	D,F,O,U	*oleic acid*	F
methyl amine	D, O	*ornithine*	D, O,U
methyl bromide	D,F	*oxalic acid*	D, U
methyl carbonate	D, U	*oxamide*	D,F
methyl chloride	D, U	*oxygen*	D,F,O,U
methyl ether	D, O,U	*oxyphenyl propionic acid*	F
methyl ethyl ether	D, O,U	*palmitic acid*	D,F

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pantothenic acid	D,F,O,U
paracresol	F
parahydroxyphenylacetic acid	U
parahydroxyphenyl-propionic acid	U
parahydroxyphenylpyruric acid	U
paraxanthine	U
paracresolsulfuric acid	U
pelargonic acid	F
penta decanoic acid	F
pepsin	O,U
phenetole	D
phenol	D, U
phenol oxidase	O
phenolphthalein	D,F
phenolsulfuric acid	U
phenyl acetate	D
phenylalanine	D,F,O,U
phosphorus	D,F,O,U
phosphorus tetroxide	F
potassium	D,F,O,U
potassium carbonate	D,F,O
potassium chloride	D,F,O,U
pregnanediol	U
pregnanetriol	U
probilifuscin	F
proline	D,F,O,U
propentdyopent	F
propionaldehyde	D, O
propionamide	D,F
propionic acid	D,F, U
propionyl chloride	D,
propyl acetate	D
propyl alcohol	D, O,U
propylene	D
propylene oxide	D
propyl ether	D
propyl formate	D,F
propyne	D
purine	D,F, U
pyridine	D,F
pyridoxal	D, U
pyridoxamine	O,U
pyridoxic acid	U
pyridoxine	D,F,O,U
pyroncomane	F
pyrone	D
pyrrole	D,F
pyruvic acid	D, O,U
rennin	F
resorcinol	D,F
riboflavin	D,F,O,U
ribose	D, O
rubidium	O
sarcosine	D,F, U
selenium	O,U
serine	D,F, U
silicon	U
skatole	D,F
skatoxylsulfuric acid	U
sodium	D,F,O,U
sodium carbonate	F,O
sodium chloride	D,F,O,U
sodium phenate	D
sodium sulfate	D, O
sphingosine	F
squalene	D,F
stearic acid	D,F
strontium	F,O
succinic acid	D
succinopurine	U
sucrase	F
sucrose	D, O
sulfur	D,F, U
sulfur dioxide	D, U
sulfur trioxide	U
sulfuryl chloride	F
taurine	D, O,U
taurocholic acid	F
tetrahydrocortisol	U

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tetrahydrocortisone	U	*tryptophan*	D,F,O,U
tetrahydropyran	D	*tyramine*	F
theophylline	U	*tyrosine*	D,F,O,U
thiamine	D,F,O,U	*undecylic acid*	F
thiazole	D	*urea*	D, O,U
thionyl chloride	F	*urease*	O
thiophene	D	*uric acid*	D, O,U
thiourea	D, U	*urobilin*	F, U
threonine	D,F,O,U	*urobilinogen*	F, U
tin	O,U	*valeric acid*	D,F
titanium	O	*valine*	D,F,O,U
toluene	D,F	*vinyl alcohol*	D
toluidine	D	*vinyl chloride*	D
tridecoic acid	F	*water*	D,F,O,U
trigonelline	U	*xanthine*	U
trimethylamine	D, O	*xylose*	D, O
trypsin	F, U	*zinc*	O,U

readily identifiable in the ambient atmosphere with suitable instrumentation. Thus it becomes possible to locate and monitor the movements and actions of insurgent forces moving from meeting points into action, returning to regrouping locations and from there, dispersing to their hiding places or homes. The next step is certainly clear—go and round them up.

Of the four hundred identified human waste products, more than twenty are useful for monitoring man—*no matter what his environment.* Other researchers working in other related and unrelated fields such as dentistry, medicine, and atmospheric pollution—to name three—have quantitated and defined trace contaminants produced not only by man, but by his equipment, that are relatively easy to monitor. For instance, both ethanol and methanol are two by-products produced by the human body that are not normally found in the natural environment. Although the rate of production varies both with activity and time throughout the day, it remains in high enough concentrations to be monitored quite easily with the proper instruments. Such instruments, mounted in aircraft, at stationary ground locations, patrolling vehicles or packed by patrolling troops, would give the counterinsurgent a tremendous edge just by showing him that there was someone in the area.

A great many suggestions have been made pertaining to the next step—mark the insurgents. The ad-

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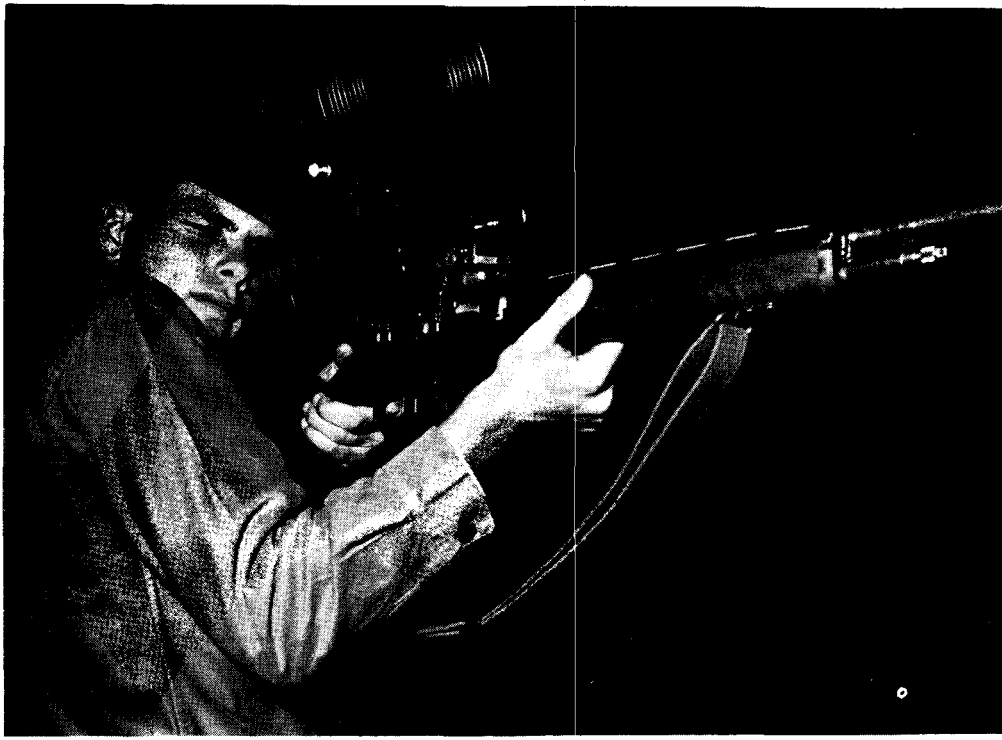

Official Marine Corps Photo

FIGURE 16. *Equipped with an infrared sniperscope, the basic AR-14, or M-14-rifle, is a versatile weapon, capable of laying down almost continuous automatic fire in either rifle or carbine version.*

vantages are obvious and can be summed up quickly: You can discover who the insurgent is, where he comes from, and where he goes. How to mark him—try indelible chemical or fluorescent dyes, invisible dyes that require an excitation source, chemicals that draw insects or Geiger counters, chemical sniffers, what have you. The Army is open to suggestions from everyone, any time, and will very carefully evaluate them.

These marking chemicals can be sprayed directly onto the insurgent, on the foliage where he is or will be operating, along the Ho Chi Minh Trail, for instance, on suspected gathering headquarters or ambush sites. It can be sprayed on suspected villages to monitor the inhabitants in their travels. It could be visible and act as much as a deterrant as an identification device; or be invisible and permit the counter-insurgent, the police, or intelligence and security forces to gather the suspected persons in for interrogation.

And so it develops that these are three major areas where intensive

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and continuing research is needed for counterinsurgency operations: 1) instrumentation for detection, 2) marking procedures, and 3) interrogation procedures—very intensive research in the technical and sociological techniques associated with police activities.

The most important parameters of any instrument system will be sensitivity, the ability to analyze extremely dilute samples, specificity, and the ability to identify a single chemical compound or number of compounds. Some instrumentation methods that are already well developed and could be applied to counterinsurgency are: Infrared, Ultraviolet, Ionization Detectors, Surface Effect Detectors, Gas Chromatography, and Particle Analyzers.

Instrumental Detection Development

Infrared is one of the oldest and most familiar techniques used by the military. Nearly everyone has seen the infrared sniperscopes developed during World War II. These particular types of instruments are now generally employed to detect hostiles approaching guarded installations for night patrol work. Generally, their range and detectability is somewhat limited. They rely on the principle of detecting body heat —or, in case of moving vehicles, detecting exhaust gases—in the near infrared region of the electromagnetic spectrum that is invisible to the human eye. See Figure 16.

As the infrared instruments in use today detect only "whole" body radiation, the hostile can simply take refuge behind, or below, screening vegetation or terrain.

The use of the infrared spectrum has long since passed the relatively crude devices used by the military today. Several commercial instrument manufacturers have marketed sophisticated infrared spectrometers capable of analyzing in the parts per million range. With instruments such as these, specially adapted to military field work, mounted in COIN aircraft, on vehicles, or in backpacks, the counterinsurgent has very sophisticated tracking devices. If the infrared spectrometer is adjusted to detect certain selected effluents of both man and/or his equipment, the counterinsurgency patrol would be able to track the insurgent unit to its destination with all the skill of an Iroquois Indian.

Present studies in air pollution have served both to define and develop certain instrumentation techniques for analyzing quickly and accurately for constituent effluents. Infrared spectrometry is by no means the best, although it would serve admirably. There are similar techniques such as Ultraviolet spectrometry, gas chromatography and emission spectroscopy that, while based on different principles, all produce the same results—that is, they are all capable of detecting and analyzing very minute particles of

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assorted chemical substances.

For instance, all are capable of analyzing for human traces (see Figure 15) that might be left on a jungle leaf as it brushed a man's face, hand, or even clothing. And you would not have to find that particular leaf either. All of these methods have sufficient detectability to follow a man's trace through a jungled or overgrown area, mounted as a backpack or in an aircraft or other vehicle.

A newer, and as promising an area of research is olfaction. On the most basic level, you accomplish this type of analysis when you sniff a jar of jam to see if it is fresh, or a stew to find out how much seasoning it needs. The Australian Army has been conducting olfaction studies on the Australian bushman for several years now to find out how he is able to track his quarry by scent alone, or find water in unfamiliar areas of the outback. Their initial findings are that man has an olfactory—or smell—index many thousands of times higher than had been supposed. And, a great deal of work has been done in designing instrumentation to do the same job. Although this instrumentation is still quite crude and could not be adapted immediately, certainly with the proper funding and programming, such instrumentation could be ready within five to ten years.

An excellent approach would be the use of liquid crystals. Liquid crystals are exactly what their name implies—liquids with crystal properties or crystals with liquid properties. Their value to the counterinsurgent lies in their ability to detect extremely minute quantities of chemical vapors and show the detection by color change. Some liquid crystals derived from cholesterols exhibit a great sensitivity to nitrates and could be used to detect nitrate residues on the hands of persons firing weapons. A liquid crystal detection system would allow counterinsurgency patrols to move into an area and screen the entire population of a village quickly and efficiently. Those found with nitrate residues could be turned over to interrogation teams for further questioning. Again, such a system would drastically cut the effectiveness of the insurgency movement as every soldier is detected and removed to a prison camp.

Biological sensors and instrumented hosts have been suggested, but are still, unfortunately, far in the future of counterinsurgency warfare. While dogs have been used as sentries for years, several problems arise in their handling. Most dogs selected for "police" duties are not easily adaptable to the hot, jungled environments that characterize much of today's conflict areas.

Biological sensors refer to the technique of using certain animal tissues—such as olfactory tissues with instrumentation to provide indications of chemical presence. While miniaturization techniques

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have progressed quite far in the past few years, *micro*-miniaturization techniques that are required to attach leads and sensors to individual biological cells are still a long way off. The same applies to instrumented hosts. Animals wired for sound and video are possible with development; but one great drawback will remain, their nonselectivity. A "wired" cat could spend a great deal of its time just surviving in a new environment.

Surface effect detectors such as seismic devices and electromagnetic detectors could be used for specific applications such as detecting underground bunkers and caves. Insurgents customarily travel light, and depend on hidden stores for logistic support to a great extent. If instrumentation could be devised to locate these depots or caches—usually hidden underground—the counterinsurgent could cut into the insurgent's mobility by forcing him to move further afield for logistic supply. This particular area will require a great deal of study. The only real detector of this type now in use is the electromagnetic, or mine detector, and unfortunately, the Coca Cola Bottling Company has been to Southeast Asia first.

Ionization detectors could be used in both aircraft and by ground patrols to detect columns of insurgents moving along hidden jungle trails by detecting both the dust they kick up and the particulate matter—skin particles, hair, clothing lint, ammunition residue, et cetera—they emit. Ionization counters would also provide an alarm system for the counterinsurgent installations such as airfields and headquarter perimeters against sabotage attacks by insurgents.

Gas chromatography provides a fast efficient method for detecting insurgents hidden in ambush, by detecting headquarter units and rest and relaxation areas. Gas chromatography depends upon the separation of various chemicals that are emitted by both man and his equipment by transporting a mixture of gases through a column filled with a stationary phase consisting of either a solid adsorbent material or a liquid. The mixture to be analyzed is drawn into and flows through a column on a carrier gas. The filling material in the column retards the passage of the components selectively so that the various constituents of the gas move at different rates. Each gas emerges separately from the column, the rate of which then indicates the composition.

The Effect of Future Developments

Now that we have approached the point in counterinsurgency warfare where we can pretty well forecast exactly what the insurgent will do and how he will do it, we are able to move our own counterinsurgency troops properly to forestall and ultimately defeat him. But at what cost?

It currently requires a ratio of

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ten counterinsurgents to one insurgent to fight effectively. The need for a large number of aggressive patrols was pointed out because the prime function of the counterinsurgent is to keep the insurgent constantly on the run, to wear him out, both in terms of physical endurance and logistics.

To reduce this ratio to the point of economic feasibility a means must be developed that will enable the counterinsurgent to locate the insurgent quickly and with a minimum of men and equipment. This will in effect, reduce the number of patrols that are required—since the primary function of the majority of patrols that will be sent out is merely reconnaissance—and thereby the number of men that are needed to perform the counterinsurgency operation.

If the number of counterinsurgents can be reduced, it follows that the cost of operations will be reduced as well. It then no longer pays the insurgent to conduct his specific kind of warfare, because the counterinsurgents are handling the problem he creates economically, with a greatly reduced requirement for men and equipment and with greatly reduced danger to the civilian population.

The geographic locale and conditions of the conflict area will be the deciding factor in the type of instruments that can be applied to the detection of both personnel and equipment. The various locales that will be encountered can be divided into three main categories:

A) The first type, of which Viet Nam is a good example, consists primarily of mountainous jungles, rain forests, and swampy deltas. In addition, there are long, undeveloped borders with unfriendly countries and irregular coast lines. Under these conditions, the perimeter of the area is difficult to monitor and the terrain makes concealment relatively simple. The counterinsurgents would find it almost impossible to monitor from stationary bases, as they would likely find themselves in the heart of enemy territory. Unless, the instrumentation systems were set up before insurgency had begun and supply routes were well established, all of which would require a certain amount of long-range planning on the part of the national government. The monitoring system under such conditions must be rapidly transportable —by aircraft—and used to monitor suspicious areas where the insurgents are suspected operating, with emphasis being placed on trails and known ambush sites.

In addition, long, irregular coast lines—such as are found throughout most of Southeast Asia—dictate that severe attention be paid to sea routes. In-

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surgents will not be limited to ports with docking facilities—although they will make use of them if possible. In Southeast Asia, particularly where the junk is a common means of water transportation, the patrol system must be applied to naval craft—fast, well armed craft, supplemented by junks, coastal craft, and air reconnaissance will prove very effective in interdicting illegal equipment flows.

B) The desert areas of the world—for example the Sinai desert—present an entirely different picture. This type of area is sparsely settled and is relatively simple to monitor. Air and manned reconnaissance posts, supplemented with frequent patrols, make it nearly impossible to conceal the presence or movements of large numbers of men or supplies. Various combinations of day and night aerial photography, observation posts with listening devices, night vision aides, line of sight radar, infrared, and seismic detectors concealed at strategic spots will adequately secure such areas.

C) The third type of area and one that can be easily secured, is an island such as the Dominican Republic. Islands usually present compact areas with well-defined shore lines that lend easily to naval blockade. Naval blockades are effective for interdiction—as was illustrated by the blockade of Cuba in late 1962 and early 1963. Almost the same types of monitoring equipment can be applied to islands, that are used with deserts, but with a greater concentration of reconnaissance flights and aerial photography techniques.

Instrumentation methods will be useful in the three phases of any conflict—pre-hostilities, hostilities, and post-hostilities, particularly in the last instance where extreme control must be exercised to prevent the insurgency from recurring.

A second factor that is becoming increasingly more important in the conduct of counterinsurgency operation is the state of the health of key individuals—both in the insurgency movement and in the countries that are backing the insurgents. A key example is the health of Ho Chi Minh. If he is in fact not in complete control of his government as the rumors have it, what will be the future course of the war in Viet Nam and on insurgency movements in the neighboring countries of Laos, Thailand and Cambodia? What, in fact, will be the course of the conflict in all of Southeast Asia from India to Australia? Strong men, although often dictatorial, do maintain stability, and a knowledge of the deterioration of their health would allow the counterinsurgents to revise plans to allow for in-

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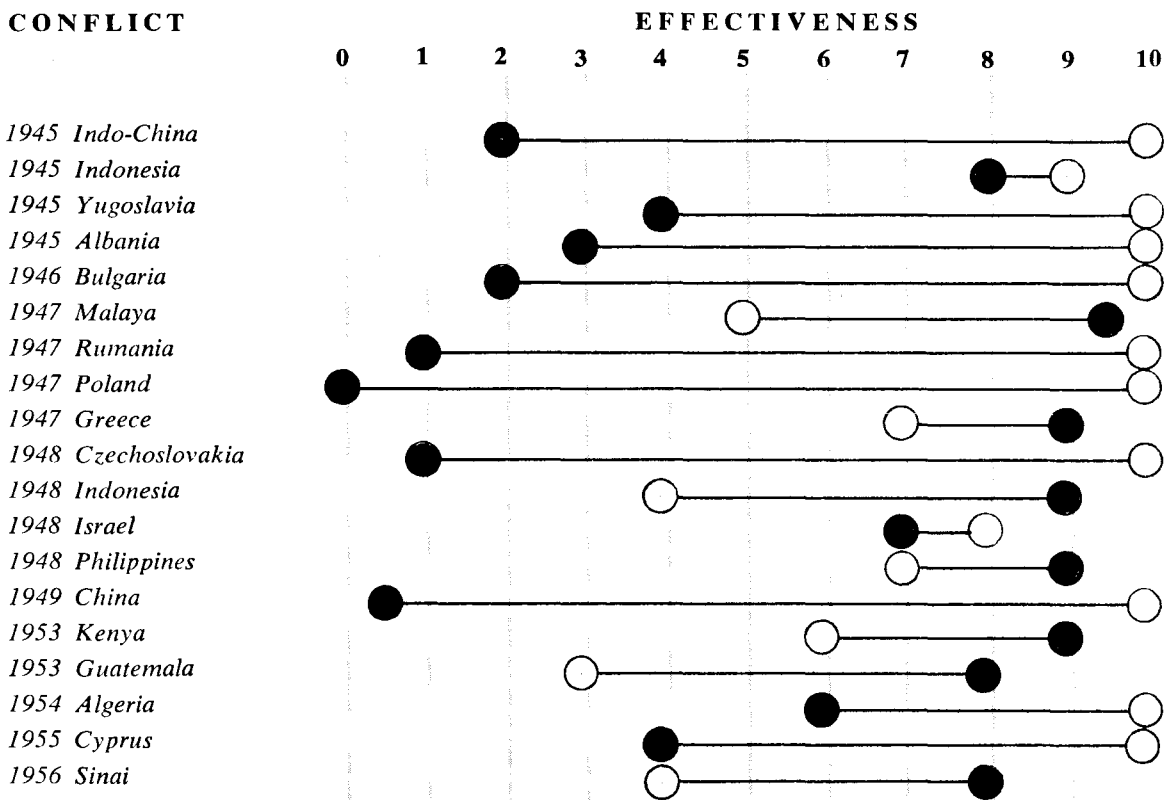
FIGURE 17.

INSURGENCY VS COUNTERINSURGENCY 1945 TO 1966



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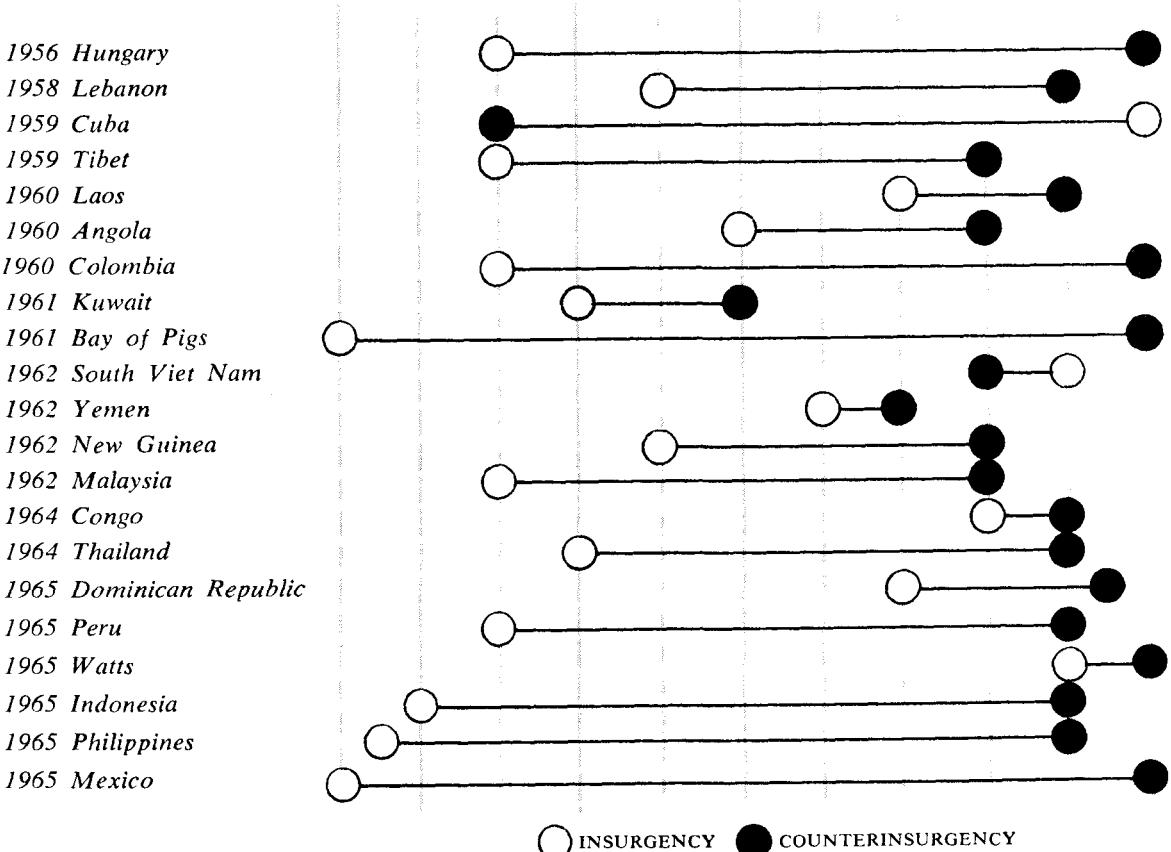

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creased or decreased insurgency action.

Methods are being developed today that will allow remote monitoring of the general health of these key personnel—long-range optical and electromagnetic scanners for monitoring electrocardiogram and electroencephalogram, body vibrations, temperature and chemical analysis of various components of saliva, blood, urine, and feces. These measurements would allow the counterinsurgency medical staff to describe a health profile of the individual, if measurements could be taken relatively frequently and over an extended period of time. These "health profile" techniques are already being worked out and are the basis of the Predictive Medicine concept.

Curiously enough, as man delves deeper into space and space missions become more sophisticated, new and different techniques will result as technological "fall-out" that will extend the counterinsurgent's ability to cope with the insurgent. A manned space station, equipped to provide frequent and periodic surveillance of the Earth's surface below, will enable the counterinsurgent to spot great masses of men and supplies moving down well-hidden or camouflaged trails—the Ho Chi Minh trail, for instance.

Various instrumental devices ranging from long-range and fine-detail radars to handheld binoculars will also provide the counterinsurgents with masses of detail on insurgent moves. Aircraft have definite limitations as far as detailed surveillance of surface features and troop movements go. They are also limited in many instances by weather. Long-range radar sophisticated infrared, ultraviolet, ionization detectors, mass spectrographic analysis, liquid crystals, et cetera, will prove a match for the monsoon weather that plagues reconnaissance aircraft in Southeast Asia, and the insurgents will no longer be able to take advantage of the monsoon season to prepare for the coming dry season's fighting. In combination with satellites, more sophisticated techniques in high flying reconnaissance aircraft, such as the now familiar YF-12A, the RB-57F and the U-2 will be supplemented by newer, faster—or slower—flying reconnaissance vehicles. The ability of the human eye to detect ground features is now much greater than was believed pre-Gordon Cooper and the present Gemini flights.

Recent experiments that have been conducted with dolphins and other animals of the order Cetacea indicate that these animals possess high levels of intelligence and are readily adapted to training. It is by no means impossible that they will, in the not-too-distant future, be able to supply us with various types of sea-going reconnaissance concerning the flow of men and equipment into surgent or potential insurgent areas.

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Which brings up the moral question—if these animals prove to be highly intelligent, do we have the moral right to involve them in our petty quarrels? For one thing, they will suffer very little if we should all blow ourselves to hell and gone. They have never depended on us, and would probably get along just as well, if not better, if the Earth were cleared of man and his petty squabbles. And this is a moral question that should concern all who consider such applications.

Figure 17, if it accomplishes nothing else, illustrates the complexity of insurgency and counterinsurgency warfare. The most obvious indication is that, since 1959, the tide has turned steadily against the insurgent, at least as far as all-out success is concerned. It also shows that counterinsurgency success is not limited to the west—Hungary, Tibet, and the Bay of Pigs for example. For the insurgent, he can list as the last *complete* success, the Cuban Revolution.

The period from 1945 to 1956 might—with the notable exceptions of Greece, Indonesia, and the Philippines—be considered the Golden Age of Insurgency Warfare. With Hungary in 1956, and the end of the Malayan campaign, the counterinsurgent began to come into his own. Note also, that as the campaigns move toward 1965, the band spread between insurgency and counterinsurgency grows longer until the attempted overthrow of the government in Dominican Republic and Indonesia, the initial insurgency attempts by the revived Hukbalahop movement, and the very abortive Mexican attempt were complete failures.

Given the present world situation and the hopes and ambitions of what are now essentially four power blocs—the West, the Soviet Bloc, the Neutrals, and the Sino Bloc—it appears as if world politics are going to complicate tremendously. With the basic counterinsurgency techniques now worked out and various refinements being made, the question becomes—what next? Will the next stop be a return to the "old fashioned" aggressive warfare of the Nazis and Japanese fascists? Perhaps history does indeed repeat itself.

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"... But Liars Figure!"

The following results of careful statistical studies will serve, we are sure, to disprove many long-held superstitions. Anyone doubting the validity of these statistical analyses is invited to recheck the situation—and will, perhaps, gain some understanding of the observed phenomenon that human beings are deeply and satisfyingly convinced of the statistical analyses that prove their preexistent beliefs, while holding statistics meaningless when their beliefs are attacked.

1. Human Reproduction Does Not Occur.

Careful medical studies show that less than one sperm cell in 250,000,000 reaches and fertilizes an ovum. Since this is statistically insignificant, it can be ignored.

2. Stars do not exist.

The entire sphere of the heavens was divided into ten billion equal areas, and a careful photoelectric survey made, sensitive to the limits of human eyes. Aside from a very few random responses—probably due to random noise generation in the electronic circuit—none of the "stars" of superstition were found; only the well-known Sun, Moon, Venus and Jupiter were recorded. The occasional noise bursts constituted only about 1 part in 1,250,000 and are clearly statistically insignificant.

Efforts were made to correlate even these random noise-responses with some of the ancient superstitious "constellations," but this proved impossible, since the folklore experts were entirely unable to give a usable mathematical-logical statement of what they meant by, for instance, "The Great Dipper."

Readers are cordially invited to supply us with any further items of such superstition-breaking statistical studies. ■ *The Editor.*

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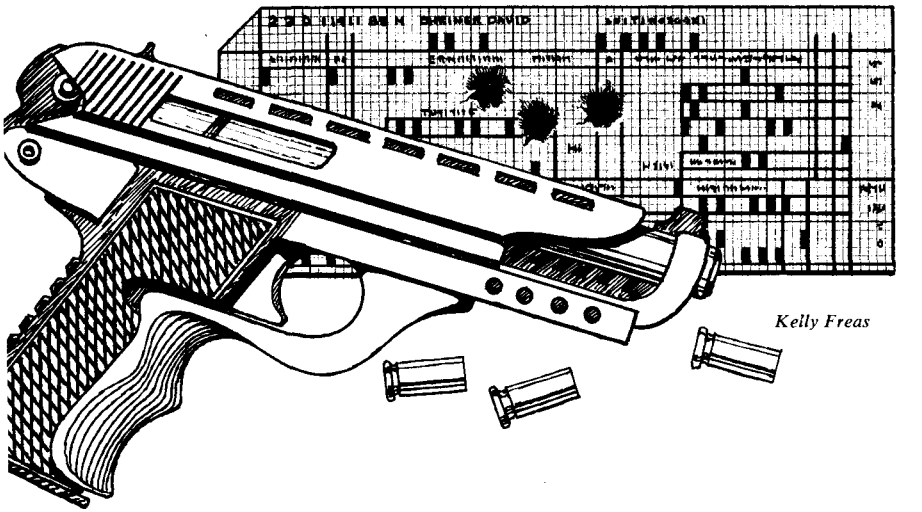

Kelly Freas

He had no real excuse for being what he was—except he was born that way. And he had old-fashioned ideas derived from tales of long ago. Which had the usual effect inappropriate ideas have—

ROMP / MACK REYNOLDS

Rosy Porras shucked off his jerkin and began to shrug into the holster harness. As he settled it around his chest, he scowled at the row of sport jerkins in his closet. Styles these days weren't conducive to concealing a heavy-calibered shooter.

A bell tinkled and Rosy turned his scowl to the screen sitting next to the bed. He wasn't expecting anybody. He hesitated a moment, unbuckled the harness again and threw it into a chair, then went over and flicked the door screen switch.

It was a stranger. Young, efficient looking, his suit seeming all but a uniform, his face expressionless.

Rosy pursed his lips in surprise.

Well, there was no putting it off. He reversed the switch so the other could see him as well and said, "Yeah?"

The stranger said, "Phidias Porras?"

Rosy winced at the use of his real first name. It had been some time since he had been exposed to it. He growled, "What'd you want?"

The other said, "Willard Rhuling, Category Government, Subdivision

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Police, Branch Distribution Services. I'd like to talk to you, Citizen."

Rosy Porras scowled at him. A DS snooper. That's all he needed right now, with the boys expecting him in a few minutes.

"About what?" Rosy said. "Listen, I'm busy."

The other looked at him patiently. "About your sources of income, Citizen."

Rosy said, "That's none of your business."

Willard Rhuling said, still patiently, "To the contrary, Citizen, it's my job."

"You got a warrant?"

Rhuling said slowly, "Do you really want me to get one, or can we sit down and just have a chat?"

"Wait a minute," Porras growled in disgust. He flicked off the screen, went over and picked up the shooter and holster. He put them in a drawer and locked it and then left the bedroom and went on through the living room to the apartment's front door. He opened it and let the DS man enter.

Willard Rhuling suddenly stepped close to him and patted him here, there—a quick frisking.

Rosy Porras stepped back in indignation. "Hey, take it easy, you flat. What kind of curd you pulling off?"

Rhuling said mildly, "I've heard you sometimes go heeled, even in this day and age, Phidias."

Porras winced again. "Listen, call me Rosy," he growled. "Everybody does." He led the way into the living room.

Willard Rhuling let his eyes go around the room and did a silent whistle of appreciation. "No wonder, in view of the fact that I can't find any record of you working since you came of age. Things are pretty rosy, aren't they? How do you manage to maintain this apartment on the credit income from the Inalienable Basic Common stock issued you at birth? Our records show you are only a Mid-Lower. Your Inalienable Basic doesn't begin to call for a place like this. This is Upper-Middle, or even Low-Upper caste, Porras."

Rosy had started toward the auto-bar, but, remembering what the evening had in prospect, changed his mind and sank down into a chair. He didn't invite the other to be seated.

He said, "A friend loans it to me."

"I see. Where is this friend?"

"He's on a vacation over in Common Europe."

"And when will he be back?"

"I don't know. It's a long vacation. Listen, what business is it of yours?"

Willard Rhuling had taken a place on a couch. He looked about the room again. "And all these rather expensive furnishings. They belong to your friend, too?"

"Some of them," Rosy said. "And some of them are mine."

Rhuling brought a notebook from

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an inner pocket and flicked through it. He found his page and checked it. "Phidias Porras, alias Rosy Porras," he read. "Category Food, Subdivision Baking, Branch Pretzel Bender." He frowned. "What in Zen is a pretzel bender?"

Rosy Porras flushed. "How'd I know?" he growled. "I was born into my category, like everybody else. My old man was a pretzel bender and his old man, and his. But that branch got automated out a long time ago. Can I help it if there is no such work. I just live on my credits from my Inalienable Basic."

Rhuling looked at him patiently. "You drive a late model hovercar. Where did you acquire the credits for it?"

Rosy grinned at him. "I didn't."

The other's eyebrows went up. "You admit it? That you got this car without credits to exchange for it?"

"I won it gambling."

"Oh, come now."

Rosy Porras, in exaggerated nonchalance, crossed one leg over the other. He said reasonably, "There's no regulation against gambling."

The other said disgustedly, "Don't be ridiculous. Gambling isn't practical on anything but a matchstick level. Of course, there's no regulation against it, but when our system of exchange is such that no one but you yourself can spend the credits you acquire as dividends on your Inalienable Basic stock, or what you earn above your basic dividends, gambling becomes nonsense."

Porras was shaking his head at him. "Now that's where you Category Government people haven't figured out this fancy system to its end. Stutes that like to gamble, like to gamble period, and they'll find a way. Sure, we can't spend each other's credits, but we can gamble for *things*. Suppose a dozen or so poker addicts form kind of a club. One of them sticks in his hovercar which he had to pony up a hundred credits for; another sticks in a diamond ring that rates fifty credits; another puts in a Tri-Di camera that set him back twenty credits. O.K., the banker issues chips for the credit value of every item the group members put up. And if any member wins enough credit chips he can 'buy' the thing he wants out of the club kitty."

Rhuling was staring at him. "I'll be damned," he said.

Rosy Porras snorted amusement. "You must be from out of town," he said. "You mean you never heard of gambling clubs?"

The other cleared his throat. He said, ruefully, "Undoubtedly, I'll be hearing more about them soon. There's no regulation against them now, but there should be."

"Why?" Porras said, letting his voice go plaintive. "Listen, why can't you DS characters leave off fouling up everybody you can?"

The other said patiently, "Because under People's Capitalism, Citizen, no one can steal, cheat or con anyone else out of his means of ex-

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change. Or, at least, that's why my category exists. The DS is interested in how a Rosy Porras can live extremely well without having performed any useful contribution in any field for his whole adult life."

Rosy's expression made it clear he was being imposed upon. "Listen," he said. "I got a lot of friends. I haven't been too well lately, I been sick, see? O.K., so these friends of mine pick up the tab here and there."

"You mean friends have been discharging your obligations by using their credits to pay your bills?"

"There's no regulation against gifts."

"No, there isn't," Rhuling admitted, unhappily. "But discharging a grocery bill at an ultra-market isn't exactly the sort of gift one gives a man in his prime."

"No regulation against it."

Rhuling said. "And this is your sole method of income, save the dividends from your Inalienable Basic stock?"

"I didn't say that. I do a lot of people a lot of favors and then maybe they do me one. And, like I say, I belong to some of these gambling clubs."

"And always win?"

Rosy shrugged hugely. "They don't call me Rosy, for nothing. I'm pretty lucky. Listen, I got some business needs taking care of. Do you really have anything on me, or are you just wasting both our time?"

Willard Rhuling came to his feet with a sigh. He looked down into his book again. "General Aptitude I.Q. 136," he read. He looked up at the other. "And here you are, a full-time bum."

Rosy stood, too, scowling. "Listen," he said, "I don't have to take that from you. You got my category. I'm a pretzel bender. What can I do? The job's been automated out of existence."

"You can always switch categories, work hard and possibly run yourself up a couple of castes."

Rosy sneered. "Sure, that's the theory. And maybe it sounds good to somebody like you. You're probably a Mid-Middle, at least. And born into your caste, you've got it made. But when you're a lower, about the only category you can switch to that you've got a chance in is Military, or Religion, and I'm not stupid enough to go into one, and not phony enough for the other."

Rhuling looked at him speculatively. "We'll see just how stupid and phony you are, Porras. I have a sneaking suspicion that you're going to wind up in a Psychotherapy Institute, Citizen."

"Yeah? Listen, my stute pal, I got a *lot* of friends, understand? You'll have a time getting *me* into a pressure cooker."

"We'll see," the DS man said grimly. He turned and started for the door. "See you later, Rosy."

Rosy Porras scowled after him. It didn't do a man any good to have

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the DS on his tail. He wondered uncomfortably what he had done to draw their attention. In this age, a grifter's first need was to remain inconspicuous.

Rosy Porras was already late but he was taking no chances. He drove his hovercar into the downtown area and into the heaviest of traffic and then spent the next twenty minutes doubling and doubling back still again. All he needed was for some snooper such as Rhuling to be shadowing him.

Evidently, he was clear. He finally left the car in the parking cellars of a large hotel and made his way to one of the popular auto-bars above. He found an empty booth and dialed a drink, putting his credit card on the receipt screen. This was one of the few things he had to use his own skimpy credits for. He sipped the drink slowly and checked the occupants of the other tables unobtrusively.

When he was convinced of their innocence, he let his finger thump twice on the table and Pop Rasch and Marvin Zogbaum came over and sat down with him.

Pop Rasch, a heavy-set, gray-faced man with obvious false teeth, said sourly, "Where in Zen you been? We were about to fold the whole job."

Rosy said, "A snooper from the DS police turned up and grilled me at the apartment."

Pop said, "Oh, oh."

Porras waved a hand negatively. "It was nothing. Just routine."

"How'd he know where to find you?"

"I suppose they got ways. Anyway, I guess I'd better move on. We been working this town too hard anyway. Maybe I'll go out to the West Coast."

Marvin Zogbaum, a clerkish looking type and out of setting with these two, said nervously, "Well, I suppose then we'd better call off tonight's, ah, romp."

"Romp," Rosy snorted at him. "You been watching those telly detective shows? You oughta stick to the fracases, Marv." His tone held deprecation.

Zogbaum said defensively, "I'll watch whatever I please, Porras."

"O.K., O.K.," Pop Rasch said. "Let's not get into a silly argument. That's just what we need right in the middle of a job. What'd you say, Rosy? Should we call it all off?"

Rosy Porras grumbled. "Can't afford to now. We need a good taw, in case of emergencies."

Marv Zogbaum said, still miffed, "Maybe you do, but I *work* in my category. I've got a job and I'm clean."

Rosy snorted. "You're about as clean as a mud pack. You put in minimum time on that job of yours and live like some of these Uppers holding down premium positions on double hours. The first time the DS gets around to checking you, you're going to be doing some fast talking."

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Pop Rasch said, "And all we have to do is start squabbling among ourselves and we'll all wind up in a Category Medicine Psychotherapy flat-house learning to adjust to society." He grimaced at the thought.

Rosy said, "Listen, let's get going. We've been casing this job for weeks. There's no point in panicking out now. Nothing's happened except a DS snooper named Rhuling talked to me for ten minutes."

"Rhuling!" Rasch said.

Rosy looked at him. "Somebody you know?"

"He's from Neuve Albuquerque. A real burn off stute. One of those yokes who takes his work seriously. I got a friend that ran into this Willard Rhuling."

Marv Zogbaum blinked. "What happened to him?"

"What'd ya think happened to him? He's got a silly job now stooging for some Category Research technician, or something. Why, when I see him on the street, he's hard put to remember me. Brainwashed."

Rosy Porras got to his feet and growled, "Let's get going. It's late as it is."

Marv Zogbaum brought up the rear, disgruntled, but he followed.

They took Pop Rasch's heavy sedan to the records section of the Administration Building, which they had already cased thoroughly. They parked half a block down from the side entry. Pop and Marv Zogbaum sat in the front seat, Rosy in the back.

Rosy opened the overnight bag which Rasch and Zogbaum had brought along and unfolded a long, pipelike device. He screwed an object resembling a wind instrument's mouthpiece to the end.

He said, "You're sure of these details, eh?"

"Yes, yes," Zogbaum said nervously. "He's the only one in the building at night. He sets up various routine matters for the day shift. But for all I know, he's already gone in. I think we're late. Perhaps we'd better put it off."

"Don't be a funker," Rosy grunted.

"Here comes somebody now," Pop Rasch growled softly.

"It's him," Zogbaum whispered. "Are you sure . . ."

"Knock it," Rosy said.

The lone pedestrian passed without looking at them. When he had gone a dozen feet or so, Rosy Porras rested his pipe on the ledge of the window and puffed a heavy breath of air into the mouthpiece.

The pedestrian clapped a hand to his neck as though swatting a mosquito, and went on.

Rosy grinned. He began taking his device apart again. "There's the world for you," he told his companions. "The simpler things you use, the bigger the wrench you can throw into the most complicated machinery these double domes can dream up. A blowgun!"

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Pop Rasch said, "This was your idea, Rosy. How soon will it hit him?"

"In about fifteen minutes. Then he'll go out like a light and wake up in maybe six hours with a blockbuster headache, but no memory of anything but sleeping."

"That'll give us plenty of time to finish the, uh"—Zogbaum looked at Rosy defiantly—"romp and leave the place all cleaned up so nobody'll ever know we've been there. Six hours is plenty of time."

Pop Rasch looked at him. "Why don't you take a trank," he said. "Nothing to be nervous about. All we gotta do is sit here for twenty minutes."

"I can't afford to be tranked," Zogbaum said, "and I hate to wait."

At the end of the twenty minutes they left the car and walked unhurriedly to the door of the building which the lone pedestrian had entered. The street was deserted at this time of night. Pop Rasch carried the valise.

Pop looked up and down the street as a double check, then hunkered down. The lock on the door yielded to his efforts in a matter of minutes.

Pop Rasch sighed and said, "They don't make them the way they used to. No challenge, like." He added, a note of nostalgia in his voice, "They don't even have watchmen, anymore."

Rosy Porras entered first. He looked up and down the halls. Some lights were burning. Not many. The Administration Building was inoperative at night.

"All clear," he said. "Let's go." Automatically, he shrugged his shoulders to loosen his harness and have the feel of the handgun ready to be drawn.

They proceeded down the hall. Pop Rasch had a simple chart of the building in his hand. They turned several corners, finally emerged into a long room banked with Tabulaters, Collaters, Sorters and Computers. Leading off it, in turn, were several rooms of punched-card files, tape files, shelves of bound reports.

"O.K.," Pop said to Marv Zogbaum. "Now you're the boss. Go to it. Just for luck, I'm going to look up that cloddy Rosy claims is going to be sleeping for the rest of the night."

"It's not necessary," Rosy growled. "He's got enough dope to keep him under."

"Just the same," Pop said, "double-checking never hurt nobody—especially since he's the only guy in the building."

Marv Zogbaum wet his lips nervously and entered the first of the file rooms, after taking up the valise. He opened the bag and brought forth a sheaf of closely typed reports.

He said importantly, "Now you two leave me alone. I have to concentrate." He fished from the valise a small manually operated card punch.

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"Take it away, fella," Rosy said tolerantly. "I'm the heavy. I'll stand guard."

Pop Rasch left on his checking mission.

Rosy Porras had remained free to operate on the wrong side of a society that was supposedly crime free, only by exercising an instinct for self-preservation that had served him well on more than one occasion when he found himself in the dill.

Something didn't feel right now.

Pop Rasch, an old pro, capable of becoming bored even while on a job, had sunk into a swivel chair and had actually drifted off into a fitful sleep, snoring raspingly.

Marvin Zogbaum was busy in the files, humming and sometimes whistling to himself in concentration. He'd pull a card here, another there, sometimes substituting one from the valise, sometimes punching another hole or so. On several occasions, he displaced whole boxes of tapes, or cards, and actually stored three of them away in the bag.

Rosy Porras, suddenly unhappy, left the room and retraced the route by which they'd progressed through the building.

Everything looked the same.

He returned to the door by which they had entered, and opened it a fraction to peer out along the darkened street.

There were three hovercars that hadn't been present earlier, parked out there.

He closed the door quickly. His face was expressionless. The gun slid into his hand as though wizard-commanded. He stood for a long moment in thought, then moved in quick decision.

He paralleled the wall for several hundred feet, along the semidark hallway, then stopped by a window. It took a while for his eyes to accustom themselves to the dark outside. Across the road was a small park, benches, trees, bushes, a small fountain.

There was a man quietly sitting on a bench alone. After a time Rosy Porras was able to make out two other figures standing behind tree trunks.

There was no doubt about how things stood now. The whole thing had pickled. Rosy moistened dry lips.

He hurried back to the room where Marv Zogbaum labored over the punched cards and tape files. Pop Rasch still slumbered fitfully.

Rosy fumbled through the report sheets which Zogbaum had brought with him. He kept his voice even. "You finished with this one of Dave Shriner?" he said to Marv Zogbaum.

Zogbaum looked up impatiently. "Shriner, Shriner? I don't remember them by name."

Rosy said, "Code 22D-11411-88M."

"Oh, that one. Yes," Zogbaum muttered. "All finished. Don't bother me now. I've got a dozen to go."

"O.K.," Rosy said. Unobtrusively,

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he put the report sheet in his pocket and left the room.

He walked softly by Pop Rasch and made his way back into the corridor. He set off at a pace for the far side of the great building, making his way by instinct and quick animal reasoning rather than by knowledge of this part of the establishment.

Up one corridor and down another.

It was a matter of ditching the other two. Pop Rasch was too old to move fast enough and Zogbaum was too jittery in the dill to trust. The situation had pickled now and it was each man for himself.

He came finally to a window that opened on a dark alley-like entryway. He peered through it. Could see nothing.

He flicked the window's simple lock and drew it aside. He threw a leg over the sill and dropped to the ground below.

A voice chuckled and said, "Got you, you funker!" Rosy Porras felt arms go around his body.

He dropped suddenly, letting his legs go from under him so that the full weight of his husky body was on the other's arms. He fell on through, his buttocks hitting the ground. Without aim, he threw a pile-driving punch upward and struck low into the other's stomach.

The voice that had chuckled but a moment ago, gave out with a deep groan of anguish. Rosy rolled quickly, came to his feet and lashed out at the other with both hands. It was too dark to strike accurately, but he could tell the other had crumpled.

The gun was in his hand again and he peered down, indecisively. He had no time to make sure of the other. He spun quickly and ran for the entryway's head.

He paused a moment there and looked out. The way seemed clear. This part of the Administration Building opened onto the back of extensive offices, devoted to lower echelon workers. He holstered the gun.

Rosy Porras walked rapidly, but kept himself from a run. It was a matter now of relying on the good fortune his name promised. It was a matter of getting a hovercab before things exploded behind him.

But even as he hurried toward a more traffic ridden street, his mind was checking back, reevaluating.

Whatever had gone wrong, shouldn't have. It was all but impossible. Neither Zogbaum, nor certainly Pop Rasch would have purposely betrayed them. Not any way that he could figure it.

He went back over the day. There had been nothing untoward until the appearance of the DS man, Willard Rhuling. Could he have said anything to Rhuling that had given the other a clue? No. Was there any way in which Rhuling could have tailed him? No. He had taken every precaution and then, after he had met the others, they had once again

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made sure they were not being followed.

He reached an entertainment area, hurried to a cab park. He began to dial the coordinates of his apartment, but then brought himself up sharp. He dialed the address of a hotel nearby instead.

He leaned back in the hovercab and forced his mind along the path of the past few days. No, there was nothing until Rhuling had shown up. His lips thinned in a grimace of rage. The cool, efficient effrontery of the DS snooper. The way he'd calmly entered the Porras apartment and then had the nerve to run his hands over Rosy's body checking for a gun. The frisking!

That was it! Rosy Porras quickly ran his hands through his pockets, the pockets Willard Rhuling had touched. He found it nestled down beneath a key ring and a cigarette lighter. A tiny device, no bigger than a shirt button.

Rosy stared at it and snarled. He threw it out into the street. A subminiature direction transmitter! Rhuling had planted it on him back there in the apartment and the DS operatives then had been able to tail him at their leisure. A trick as simple as that. Pop Rasch would have laughed him to scorn.

They probably had Pop by now, and Marv Zogbaum, too. And here he was on the run, simply because he'd been too stupid to consider the possibility of his having a bug planted on him.

He left the hovercab at the hotel near his apartment house. He walked through the lobby, passing by the auto-bar although he would have given years of his life right now for a quick double shot of guzzle. He emerged by a side door and strolled in the direction of his apartment. He couldn't make up his mind whether or not he had the time to spend five minutes gathering up . . .

No, he didn't. A hovercar zoomed down before him and immediately in front of his building. Rosy Porras stepped into a doorway.

It was Rhuling, the DS operative. He vaulted from the open car and hurried toward the door.

"That's that," Rosy growled. It wasn't as though it was disastrous. Rosy Porras had decided long ago in his career that times would come when a complete abandonment of all luggage and belongings would be necessary. To the extent that you could divorce yourself from such impedimenta, you were better off.

He reentered the hotel by the entry he had left it only moments before, and ordered a cab. While he waited, he went into the auto-bar and dialed a double shot.

At a phone booth, he looked up the address coordinates of David Shriner and noted them down on the report he had surreptitiously taken from Marv Zogbaum.

In the hovercab he dialed the coordinates of Shriner's apartment house and let his mind churn over half-formed plans.

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The hour was getting on by the time he stood before the screen in Shriner's door. Rosy Porras snapped the fingers of his right hand in a fine case of jitters and muttered obscenities at the delay.

Shriner's plump face lit up the screen and he grinned. "Rosy!" he said. "Come on in."

Rosy Porras pushed the door and emerged into the entrada and then went on through into the ample living room. In a moment, Shriner appeared, yawning, from a bedroom. He wore a robe over pajamas. Shriner was a second-string telly actor, noted for his comedy and exuberance.

He closed the door behind him and made a gesture with his head. "Ruth's asleep," he said. "Keep it low. I thought the deal was you were never to come here."

Rosy growled something and made his way over to the auto-bar where he dialed himself a double brandy.

Shriner said excitedly, "How did it go? Everything all set?"

Rosy took his drink back to a chair and slumped into it, suddenly very weary.

"Listen, Dave," he said, "a wheel came off. We're in the dill. You've got to help me."

The other's face froze. "What . . . what happened? Now look here, Rosy, I didn't commit myself to doing any more than . . ."

"Knock it," Rosy snapped. "Who'd you think you were playing with, some cloddy with a penny ante racket? I've made arrangements to put plenty of credit to your account in the past and the things you kicked back weren't as much as all that. You're in this now, if you want to be or not and the only way of helping yourself is helping me."

Shriner, a short chubby man, good living oozing from his skin, went to the auto-bar and shakily dialed himself a twin of his visitor's drink. He turned back to Rosy Porras and said, "How did the romp pickle?"

Rosy ignored the word that irritated him and summed it up briefly. "We were halfway through the job when the DS police showed up. I got away, the others were probably caught."

"What are you going to do?" the actor said, trying to keep the tremor from his voice.

"I'm going on the run to South America," Rosy told him. "I want you to get on the screen right now and order me a shuttle rocket seat to Miami and from there a flight to Sao Paulo. Then I want . . ."

The other laughed bitterly. "What am I going to use for credits? You know with"—he motioned to the bedroom door—"I spend every credit I can get my hands on." He shrugged in deprecation. "That's why I lined up with you fellows in the first place, and now look what you've done."

Rosy Porras brought the report sheet he had lifted from Zogbaum

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from his pocket and scowled down on it. "You've been credited with nearly ten thousand, enough for you to get by normally for three or four years. It's all been run into the credit records of this district. Marv got that far before we were interrupted."

Shriner blanched. "Then I'm really in the soup."

Rosy waved the paper at him and growled, "No, you're not. I've got this. It's the only clue they might have had. We had this worked out foolproof. They'll never detect the difference, especially when they figure they've got the whole business in their hands."

"But they've got this man of yours who was doing the altering."

Rosy shook his head angrily. "That doesn't mean a thing. Marv had a list of some twenty names. He didn't have any call to be interested in individuals, he was just altering totals by code number. He doesn't know you from Adam, and I've got the report sheet he was working from right here."

Dave Shriner finished his drink in a gulp. "And you think I'm safe?"

Rosy was lying, but the other was blinded by his need for hope.

Rosy said now, "Get the Night Expediter on the screen and go to work. Get my tickets, and then switch half those credits to your account in Brazil."

"Half?" Shriner protested. "Your cut was always one third which I paid over to you as supposed gifts or gambling winnings."

"That was before," Rosy growled. "Now I'm in the dill and need half."

Dave Shriner said, his eyes narrower with greed. "It wouldn't do you any good, Rosy. You can't spend my credits. I can buy those tickets for you but once you're in Brazil you'll be on your own."

"I'm taking your identification with me," Rosy told him flatly. "I've got some friends in Miami who can alter them enough for me to get by. They don't pay much attention in a foreign country anyway, just so the international credits are on tap."

The chubby actor was staring at him. "Are you drivel-happy? If you take my identification, what will I do?"

Rosy looked at him in disgust. "You'll go down to the Category Distribution offices tomorrow and tell them you lost them. Dream up some complicated story about falling out of your boat, and having to strip out of your clothes, or something. They'll give you a new set. You're a nardy actor, aren't you? What are you, an Upper-Middle? With a caste like that nobody'll think twice about it."

Shriner said unhappily, "Then what're you going to do in South America, Rosy?"

Rosy growled, "Keep in touch with some of the boys up here. When things cool, maybe I'll come back. Or maybe I'll just stay down there and make connections."

Shriner shook his head in sudden decision. "I won't do it. I'd be stick-

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ing my neck out. Sooner or later, there'd be a check-back and I'd be in the dill and . . ."

The heavy shooter was in Rosy Porras' right hand, held negligently, pointed at the floor between them. Rosy Porras' face was empty and cold cold.

The chubby man stared in fascination at the weapon. He had never seen one, other than the props in the telly shows, before.

Rosy said, "Listen, get on that screen, you funker."

Dave Shriner couldn't take his eyes from the shooter. "Yeah, yeah, sure. Sure, Rosy. Don't get nervous, Rosy. You know me . . ."

"I'm not nervous," Rosy Porras said.

Rosy had an hour to kill before the shuttle rocket for Miami. He was safer here than any place else he could figure. So far as he knew, Willard Rhuling and the DS had no records of Dave Shriner, nor did either Pop Rasch or Marv Zogbaum know him. He was strictly one of Rosy's contacts.

Dave said worriedly, "Won't they think of looking for you at the shuttleports, Rosy?"

Rosy grinned at him. The worst seemed to be behind. Most problems seemed to have been solved.

He said, "That's one of the reasons I picked you, Dave. You're going to do a make-up job on me such as you've never done before. In fact, we'd better get going on that, eh?"

Dave Shriner brightened. At least it gave him something to do. He was becoming jittery sitting around with the gunman who no longer seemed to bear the old fascination, the old romantic air the portly telly actor had attributed to him. How had he ever got into this mess, anyhow? It was all Ruth's fault. Ruth with her extravagances, her constant demands.

Shriner went and got a makeup kit. For a moment, he stood back and studied the other. The face of Rosy Porras was a natural for make-up disguise. And with the use of some of Dave Shriner's wardrobe, there was no reason to believe a job couldn't be done that would pass all except a really close scrutiny.

He started to work with care. There was ample time.

As he subtly changed the seeming width of eyes, Dave Shriner cleared his throat and said, "Rosy?"

"Yeah?"

"That shooter you carry. Have you ever . . . well, used it?"

Rosy Porras grinned inwardly, "Not yet," he said.

Shriner was silent for a long moment. "Rosy, what's the idea? The sort of, well, romps you do don't call for a gun. No crime today calls for shooter. It's most a matter of figuring out ways to beat the game. To scheme methods of cheating the Distribution Services."

Rosy said gently, "To tell you the truth Dave, it's a great comfort to me. A great comfort. And, how'd we

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know, maybe a time'll come along when I do use it. You never know, Dave."

Dave Shriner cleared his throat again and began to add wrinkles to the other's forehead.

But his natural exuberance of spirit couldn't be completely suppressed. Finally, he said, "Rosy, what's the motivation? When you add it up at the end of the year, how many more credits do you actually wind up with than, say, I do?"

Rosy growled, "Probably none. Maybe I total less. Some years, when it's bad, I don't have much more than the credits from my Basic Inalienable Common. This year's been pretty good, so far."

Shriner made a moue with his plump lips. "How can you say that? Here you are with the DS police after you."

"They haven't caught me yet," Rosy said grimly. "And things won't be bad in South America."

"But *why?* You're not unintelligent. You're not one of these cloddy lowers who sit in front of their telly sets all day, sucking on trank and drooling as they watch the fracas fights. You could switch categories, somehow or other, and bounce yourself up a couple of castes or so. Get to be a Middle. In order to make a decent living the way you do, you must average higher in I.Q. than the usual yoke who holds down a regular job and earns credits."

Rosy thought about it.

"I don't like ruts," he grumbled finally, "and I don't like somebody telling me what I can do and what I can't. I don't like molds and sets of rules. I want my real share, what's coming to me, without a lot of curd thrown in." His voice had taken on a snarling quality.

"They think they've got it all worked out. Well, listen, there's never been a setup so smart that some stute can't beat the game. I'm doing it; I'm showing them."

Dave Shriner, his back turned as he fumbled with his jars of cosmetics, pursed his lips. This one was a real candidate for the Psychotherapy Institute. It was one thing, Shriner figured, trying to wrangle a few extra, unearned credits by this dodge or that, quite a few people he knew at least tried it. But here! Rosy Porras was really far out, and this crisis was bringing on the worst in him.

Shriner went back to the job of disguising the other, silent now.

Rosy Porras, a briefcase in hand, glasses on his nose, and a harried expression on his face, hustled across the shuttleport tarmac toward the waiting shuttle-rocket. He was a man of approximately sixty, his hair graying heavily at the temples, his jowls heavy and loose with age.

He allowed a stewardess to take his arm at the top of the ladder and to help him to his seat. He breathed heavily as though the quick walk to the craft and then the climb up the ladder had winded him.

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Rosy grinned inwardly. He was getting a kick out of putting this over. Dave Shriner, the actor, would have been proud of him had he been able to see the show.

He had lied to Dave. It was going to take the DS a few days to untangle all the changes Marv Zogbaum had made in the credit files, but it was only a matter of time till they traced them all down, now that they knew what they were looking for. They'd get to Dave Shriner's account last of all, perhaps, but they'd find that, too. Rosy's chance was to get to South America by tomorrow and find some way of converting those credits into something else, before the DS got around to canceling them. He had left betrayal of Pop Rasch, Marv Zogbaum and Dave Shriner behind him, but with the old Rosy Porras good fortune, he ought to be able to make it himself.

In his seat, he peered out the porthole. They would be taking off in minutes.

Willard Rhuling sank into the seat next to him. "Hello, Rosy," he grinned. "Or would it be more appropriate just to call you Phidias?"

For a brief second Rosy gaped at him, then his hand flicked for his left shoulder.

Rhuling's left hand, in turn, chopped out, all but breaking the other's wrist.

The DS man said grimly, "That's the little item that busted your rosy luck, Porras. We didn't have the time to organize a really all out manhunt—they're not often called for these days. But we knew you'd probably try to get out of town, and probably be disguised. There was just one thing. We knew you liked to carry that shooter, Porras, just like the big, bad men of the old days. And all we had to do was to spot metal detectors here and there in appropriate places, such as shuttleports. Men don't carry shooters anymore, Phidias, and yours showed up like a walrus in a goldfish bowl." ■

THAT'S THE WAY THE COOKIES CRUMBLE. . . . *by Daniel Whitton*

On one of the recent Gemini flights, it is reported that a curious and unexpected event was observed, which has since been referred to by the scientists at NASA as the "Cookie Crumb Phenomenon." A rather fragile cookie was accidentally broken before it could be eaten, and the resulting crumbs began to drift weightlessly around in the free-fall conditions that prevailed. Gradually, however, a surprising thing happened. The crumbs slowly collected on the inside of the windows of the space capsule. This puzzled everyone for quite a while; at first, people thought it might be some sort of electrostatic attraction by the quartz windows, but then this was ruled out experimentally. Finally, some ingenious soul came up with the correct but unobvious answer, easily comprehended by anyone with a rudimentary knowledge of chemistry, physics, or even general science.

Why *do* the crumbs migrate towards the windows? For the answer, see the November issue.

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TOO MANY MAGICIANS / RANDALL GARRETT

Third of Four Parts.
If you have a problem—like murder—
and carefully define the limits within which it must lie—
like magic—you'll never solve it,
if it isn't magic!

Illustrated by John Schoenherr

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LORD DARCY, Chief Investigator for the Duchy of Normandy, found himself involved in a problem that concerned more than simple murder. His friend and Chief Forensic Sorcerer, MASTER SEAN O LOCHLAINN, was across the Channel, locked up in the Tower of London on suspicion of murder.

On the morning of Tuesday, October 25, 1966, in a cheap rooming house in Cherbourg, a man named GEORGES BARBOUR was stabbed to death in his room. The first man to see the body, COMMANDER LORD ASHLEY, a special agent of the Naval Intelligence Corps, reported the discovery to the local Armsmen and to his superior at Cherbourg Naval Base. BARBOUR was a double agent who, while pretending to work for the Secret Service of the King of Poland, Casimir IX, was actually reporting to the Anglo-French, to a man known only as ZED.

Because of the importance of the crime, the local authorities contact LORD DARCY in Rouen via teleson. Since COMMANDER LORD ASHLEY had to go to London to carry information to the Chief of Naval Intelligence, LORD DARCY asked him to take a message to MASTER SEAN, who is attending the Sorcerers' Convention at the Royal Steward Arms in London.

The history of LORD DARCY's world is different from that of our own. Instead of dying from a cross-bow-bolt wound in 1199, King Richard the Lion-Hearted survived, and his bout with fever from the infected wound brought about a personality change which made him settle down to become a wise and good ruler. When he died in 1219, he was succeeded, not by the infamous Prince John, who had by then been dead for three years, but by his nephew, Arthur of Brittany, who at thirty-three, became King of an empire that included England, Ireland, Scotland, and more than half of France. He has gone down in history as Good King Arthur, and is often confused in the popular mind with Arthur Pendragon of Camelot, founder of the Round Table.

Since then, the House of Plantagenet has ruled the Anglo-French Empire, which now includes the original Angevin inheritance, plus the rest of France and the New World—including both the northern continent of New England and the southern one, New France.

Late in the Thirteenth Century, a brilliant monk discovered and formulated the Laws of Magic. Thus thaumaturgical science, rather than physical science, has become the guiding field of knowledge in LORD DARCY's world.

The morning after the murder of BARBOUR, on Wednesday, October 26th, MASTER SEAN had an appointment with MASTER SIR JAMES ZWINGE, Chief Forensic Sorcerer for the City of London. After brief conversations with SIR

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LYON GANDOLPHUS GREY, Grand Master of the Sorcerers' Guild, LORD JOHN QUETZAL, a journeyman sorcerer from Mechicoe, and MASTER EWEN MacALISTER, an oily and obnoxious specimen, MASTER SEAN went to keep his appointment. At precisely 9:30 a.m., he rapped on MASTER SIR JAMES' door. Inside, he heard SIR JAMES scream "Master Sean! Help!"*—followed by the sound of a falling body. The door was locked. Help was sent for and, by chance, LORD BONTRIOMPHE, Chief Investigator for the City of London, was on hand.*

BONTRIOMPHE took an ax and cut through the door. SIR JAMES was found on the floor in the middle of the room in a fresh pool of blood. There was no one else in the room. SIR JAMES' own knife and a large brass key which was the only one capable of unlocking the door were found near the body. Investigation has shown that there is no way in or out of the room. It is a sealed room murder in the classical sense. The obvious conclusion is that the killing was done by Black Magic, and MASTER SEAN, who was known to have quarreled with SIR JAMES on the previous day, is the obvious suspect.

COMMANDER LORD ASHLEY, who was with LORD BONTRIOMPHE at the time MASTER SIR JAMES died, delivered LORD DARCY's message to MASTER SEAN—which instructed MASTER SEAN to come to Cherbourg immediately to help solve the BARBOUR killing—and then went directly to the Admiralty Building to report to his superior. The message was of little use to MASTER SEAN; he was taken into custody and put in a comfortable cell in the Tower of London.

LORD DARCY, notified of this development by his cousin, the MARQUIS OF LONDON, is in London by that evening. He goes directly to the Palace du Marquis where he finds the MARQUIS and LORD BONTRIOMPHE waiting for him.

The MARQUIS is a huge man—an inch or so shorter than LORD DARCY but weighing some two hundred eighty pounds. His own brilliance as a deductive logician is on a par with LORD DARCY's, but he is lazy and rarely uses his deductive faculties unless forced to do so. LORD BONTRIOMPHE, while a competent investigator, has by no means the genius of the other two men. LORD DARCY realizes that the MARQUIS is using MASTER SEAN as a lever to force LORD DARCY to solve the case, thereby saving himself the trouble of having to do so—and, incidentally, saving himself having to pay LORD DARCY's salary, since DARCY will be forced to solve the murder on his own time in order to get MASTER SEAN out of the Tower.

DARCY goes to the Tower of

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London to see MASTER SEAN. The tubby little Irish sorcerer has already, by magical means, retrieved his carpetbag of thaumaturgical tools and could at any time leave the Tower, but he is staying put in the sure knowledge that LORD DARCY will get him out legally.

When LORD DARCY prepares to leave the Tower he sees that a dense fog has covered the City. The Warder at the gate is starting to call a cab for LORD DARCY when a carriage bearing the arms of the Duchy of Cumberland pulls into the courtyard. Inside it is an old friend, MARY, DOWAGER DUCHESS OF CUMBERLAND, a beautiful woman somewhat younger than LORD DARCY. She is also a journeyman sorceress. She offers LORD DARCY transportation.

As the carriage moves through the fog-shrouded streets of London, she tells LORD DARCY that she has information for him concerning the murder of MASTER SIR JAMES ZWINGE.

Her room at the Royal Steward is directly across the hall from SIR JAMES' room. At ten minutes of eight that morning she had seen a small, very beautiful girl, wearing the dress of an apprentice sorceress, leaving SIR JAMES' room after what seemed to be a heated argument. MARY DE CUMBERLAND had thought nothing of it until after MASTER SEAN was arrested. She had then made a determined effort to discover the girl's identity. The girl, she found, was a DEMOISELLE TIA EINZIG, who had been born within the borders of the Polish Hegemony. Not long ago she had left her home and spent some time in northern Italy, and finally had come to the Duchy of Dauphine in the Anglo-French Empire. But the Italians were seeking her on a criminal charge of Black Magic and she had barely escaped extradition.

MARY DE CUMBERLAND insists that LORD DARCY stay at her home in London, Carlyle House, which is already nearly filled with guests—Sorcerers and Healers who are attending the Convention. Each guest, of course, has a room at the Royal Steward, but it is expected that he will spend at least four nights of Convention Week at Carlyle House. Among these guests are: SIR LYON GREY, Grand Master of the Sorcerers Guild; SIR THOMAS LESEAUX, the renowned theoretical thaumaturgist; LORD JOHN QUETZAL, the journeyman sorcerer who is a younger son of the Duke of Mechicoe; FATHER PATRIQUE, a Benedictine Healer; and MASTER SEAN O LOCHLAINN, temporarily a resident at the Tower of London.

In a conversation that evening with SIR THOMAS and LORD JOHN QUETZAL, LORD DARCY learns two sets of facts which might or might not be significant. First: SIR THOMAS LESEAUX

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(who does not have the Talent; he is a mathematician, not a practicing sorcerer) is acquainted with the DEMOISELLE TIA, and—an observation which strikes LORD DARCY profoundly—is apparently in love with her. Second: LORD JOHN QUETZAL is a witchsmeller—that is, he can detect the presence of a practitioner of Black Magic; further, LORD DARCY has reason to believe that LORD JOHN QUETZAL has detected a black sorcerer at the Convention, but, being uncertain of himself, refuses to make any statement about him or divulge his name.

In spite of these interesting developments LORD DARCY goes to bed that night still firm in his resolution that as soon as he gets MASTER SEAN out of the Tower, he will go back to Normandy, to attend to his own business, and let the MARQUIS OF LONDON and LORD BONTRIOMPHE solve the Zwinge murder by themselves.

But the next morning a King's messenger arrives at Carlyle House to inform him that His Majesty, KING JOHN IV, wishes to see him immediately at Westminster Palace. Furthermore, a secret personal message from the King tells LORD DARCY to come armed with a pistol. This is a singular and unique honor. Only the Great Lords of State are permitted to be armed in the King's Presence, and even then only with swords.

At Westminster Palace LORD DARCY is met by COMMANDER LORD ASHLEY, the Naval Intelligence agent who reported the discovery of GEORGES BARBOUR's body in Cherbourg. This does not come as a surprise to LORD DARCY, who has already deduced that the two cases are connected. The Commander escorts LORD DARCY to a conference room in Westminster Palace. The other members of the conference have already arrived: SIR LYON GREY; PETER DE VALERA AP SMITH, Lord High Admiral of the Imperial Navy; CAPTAIN PERCY SMOLLETT, Chief of Naval Intelligence; and LORD BONTRIOMPHE. The conference is presided over by no less than the King himself, His Most Dread and Sovereign Majesty, JOHN IV.

The KING explains that a new device has been perfected—a magical device known as the "confusion projector." A demonstration of this device is given, with SIR LYON at the controls of the projector and with LORD DARCY as the subject. LORD DARCY, who is an expert with firearms, is given the simple task of loading a pistol with a single cartridge and firing it at a certain spot, but while the confusion projector is aimed at him he finds it almost impossible to load his pistol, and is unable to hit an easy target once the pistol has been loaded.

The device has primarily been designed for use against enemy naval vessels; it will prevent Navy

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crews from loading and firing the big naval guns aboard a battleship.

The LORD HIGH ADMIRAL explains the problem at hand. The Navy's double agent, GEORGES BARBOUR, had been dealing with an unidentified person known only as FitzJEAN, who was trying to sell the secret of the confusion projector to the Poles at a price of five thousand golden sovereigns —the equivalent of a quarter of a million dollars. BARBOUR had, however, reported this to Imperial Naval Intelligence through his immediate superior, ZED, and an attempt was made to lay a trap which would expose FitzJEAN. An agreement was made between BARBOUR and FitzJEAN that the latter would prove his ability to deliver the secret of the confusion projector and BARBOUR would pay him one hundred golden sovereigns. COMMANDER LORD ASHLEY was to deliver the money to BARBOUR, but BARBOUR had been killed before the transaction could be completed. The LORD HIGH ADMIRAL then reveals that MASTER SIR JAMES ZWINGE, who was murdered some twenty-four hours later in London, was actually BARBOUR's superior, the mysterious ZED.

LORD DARCY, by King's Appointment, now finds himself in charge of the case. For this he needs the assistance of MASTER SEAN O LOCHLAINN—which means that MASTER SEAN must be got out of the Tower of London. He goes directly to the MARQUIS OF LONDON and shows him how evidence can be used to indicate that LORD BONTRIOMPHE himself is guilty of the murder—although LORD DARCY is well aware that BONTRIOMPHE is innocent. The MARQUIS, confronted by evidence and a theory which he knows to be as strong as that which he used to incarcerate MASTER SEAN, yields the point. He signs a paper releasing MASTER SEAN from the Tower.

LORD DARCY, LORD BONTRIOMPHE, and MASTER SEAN go directly to the Royal Steward, and look over the scene of the crime, which has been kept static by a preservative spell. The body of SIR JAMES still lies where it fell.

It is established that no one, not even a magician, could have killed SIR JAMES inside the room and escaped without being seen. Nor could the door have been locked from the outside and the key slipped under the door, for the heavy brass key is much too large to be pushed through the narrow clearance between the bottom of the door and the floor. The only edged instrument in the room is a knife belonging to the dead man, a knife with a blade of pure silver, a knife which is normally used for magical purposes.

LORD DARCY also reveals that a letter which arrived for him that morning, tells him that his assistant,

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SIR ELIOT MEREDITH, who is working on the BARBOUR murder in Cherbourg, has shown that there was no one in the room when BARBOUR was stabbed, which indicates an apparent similarity in method between the two murders. There is one further clue which LORD DARCY apparently deems important: inside the room, on the rug just below the doorknob, and some four inches from the door itself, is a small half-moon stain with the flat edge parallel to the door. It may or may not be blood; that will have to await MASTER SEAN's analysis.

MASTER SEAN asks LORD DARCY for his permission to use LORD JOHN QUETZEL as an assistant in searching out the thaumaturgical evidence. The permission is granted; LORD DARCY and LORD BONTRIOMPHE leave MASTER SEAN to his work.

LORD DARCY asked MARY de CUMBERLAND to try to get as much information as she can from the DEMOISELLE TIA; then he and LORD BONTRIOMPHE go downstairs to interview the hotel's manager, GOODMAN LEWIE BOLMER.

DARCY and BONTRIOMPHE are given an office for the use of the Armsmen and Investigators, an office normally assigned to the night manager of the hotel. Since the entire hotel is reserved for the Convention, a register has been kept of the arrival and departure of those who are not members of the Convention. LORD DARCY asks to see it. Among the entries for the previous day LORD DARCY notes that the mail was delivered at 6:30 a.m., that COMMANDER LORD ASHLEY had come in (at 8:48) with a message for MASTER SEAN, that LORD BONTRIOMPHE has arrived (at 9:02) on a personal errand for the MARQUIS—and then his eye falls on another entry: 2:54; COMMANDER LORD ASHLEY; official business with MANAGER BOLMER.

"Official business?" LORD DARCY asks. He looks at BOLMER. "Why did they want to talk to you?"

"Not to me, your lordship. To PAUL NICHOLS, my night manager."

"About what?"

"I'm not at liberty to say. Strict instructions from the Admiralty, in the King's Name."

"I see. Thank you, GOODMAN LEWIE. Come on, BONTRIOMPHE." LORD DARCY is angry. "How far is the Admiralty Office from here?"

"Three minutes by coach," says LORD BONTRIOMPHE.

They get in the coach and order the driver to take them to the Admiralty Office.

"So CAPTAIN SMOLLETT is holding out on us," says LORD BONTRIOMPHE.

"He knows something we don't, that's for certain," says LORD DARCY.

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Part 3
XII

Lord Bontriomphe had not misjudged the time very much; it was less than four minutes later when Darcy and Bontriomphe climbed out of the coach in front of the big, bulky, old building that housed the Admiralty offices of the Imperial Navy. They went up the steps and through the wide doors into a large anteroom that was almost the size of a hotel lobby. They were heading towards a desk marked *Information* when Lord Darcy suddenly spotted a familiar figure.

"There's our pigeon," he murmured to Lord Bontriomphe, then raised his voice:

"Ah, Commander Ashley."

Lord Ashley turned, recognized them, and gave them an affable smile. "Good afternoon, my lords. Can I do anything for you?"

"I certainly hope so," said Lord Darcy.

Lord Ashley's smile disappeared. "What's the trouble? Has anything happened?"

"I don't know. That's what I want you to tell me. Why is the Navy so interested in a certain Paul Nichols, the night manager at the Royal Steward?"

Lord Ashley blinked. "Didn't Captain Smollett tell you?"

"Sure he did," said Lord Bontriomphe. "He told us all about it. But we forgot. That's why we're here asking questions."

Commander Lord Ashley ignored the London investigator's sarcasm. There was a vaguely troubled look in his seaman's eyes. Abruptly he came to a decision. "That information will have to come from Captain Smollett. I'll take you to his office. May I tell him that you have come to get the information directly from him?"

"So," said Lord Darcy with a dry smile, "Captain Smollett prefers that his subordinates keep silent, eh?"

Lord Ashley grinned lopsidedly. "I have my orders. And there are good reasons for them. The Naval Intelligence Corps, after all, does not make a habit of broadcasting its information to the four winds."

"I'm aware of that," said Lord Darcy, "and I am not suggesting that the corps acquire such habits. Nonetheless, His Majesty's instructions were, I think, explicit."

"I'm certain it was merely an oversight on the captain's part. This affair has the whole Intelligence Corps in an uproar, and Captain Smollett and his staff, as I told you this morning, do not have any high hopes that the killers will be found."

"And frankly don't much care, I presume," said Lord Darcy.

"I wouldn't go so far as to say that, my lord; it is simply that we don't feel that the tracking down of hired Polish assassins is our job. We're not equipped for it. Our job is the impossible one of finding out everything that King Casimir's Navy

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is up to and keeping him from finding out anything at all about ours. You people are equipped and trained to catch murderers, and we —very rightly, I think—leave the job in your hands."

"We can't do it without the pertinent information," said Lord Darcy, "and that's what we're here to get."

"Well, I don't know whether the information is pertinent or not, but come along; I'll take you to Captain Smollett."

The two investigators followed the commander down a corridor, up a flight of stairs, and down another corridor toward the rear of the building.

There was a middle-aged petty officer sitting behind a desk in the outer office who looked up from his work as the three men entered. He did not even bother to look at the two civilians.

"Yes, My Lord Commander?" he said.

"Would you tell Captain Smollett that Lord Darcy and Lord Bontriomphe are here to see him. He will know what their business is."

"Aye, my lord." The petty officer got up from behind the desk, went into an inner office, and came out again a minute or so later. "Compliments of the Captain, my lords. He would like to see all three of you in his office immediately."

There are three ways of doing things, Lord Darcy thought to himself, *the right way, the wrong way, and the Navy way.*

Captain Smollett was standing behind his desk when they went into the room, a pipe clenched firmly between his teeth, his gray-fringed bald head gleaming in the afternoon sunlight that streamed through the windows at his back.

"Good afternoon, m'luds," he said briskly. "Didn't expect to see you again so soon. Trust you have some information for me."

"I was rather hoping you had some information for us, Captain," Lord Darcy said.

Smollett's eyebrows lifted. "Eh? Not much, I'm afraid," he said, speaking through his teeth and around his pipestem. "Nothing new has happened since this morning. That's why I was hoping that you had some information."

"It is not new information I want, Captain Smollett. By now, indeed, it may be rather stale.

"Yesterday afternoon at 2:54 your agent, Commander Lord Ashley, returned to the Royal Steward Hotel. After that, several other of your agents came and went. The General Manager, Goodman Lewie Bolmer, has informed us that he is under strict instructions from the Navy, in the King's Name, to give information to no one, including, presumably, duly authorized Officers of the King's Peace, operating under a special warrant which also permits them to act and speak in the King's Name.

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"I could have forced the information from him, but he was acting in good faith and he had enough troubles as it is. I felt that you could give me all the information he has and a great deal more besides. We met My Lord Commander downstairs, but doubtless he, too, is under orders, so, as with Goodman Lewie, it would not be worth my time to pry the information out of him when I can get it from you.

"This much we know: Goodman Paul Nichols, the night manager, failed to show up for work at midnight last night. This, apparently, is important; and yet, your agents were asking questions about him some nine hours before. What we want to know is why. I shall not ask you why we were not given this information this morning; I shall merely ask that we be given it now."

Captain Smollett was silent for the space of several seconds, his cold gray eyes looking with unblinking directness into Darcy's own. "Um," he said finally, "I suppose I deserve that. Should have mentioned it this morning. I admit it. Thing is, it just isn't in your jurisdiction—that is, normally it wouldn't be. We have men looking everywhere for Nichols, but he hasn't done a thing we can prove."

"What do you think he's done?"

"Stolen something," said Captain Smollett. "Trouble is, we can't prove the thing we think he's stolen ever existed. And if it did exist, we're not certain of its value."

"Very mysterious," said Lord Bontriomphe. "At least, to me. Does this have a beginning somewhere?"

"Hm-m-m. Beg your pardon. Don't mean to sound mysterious. Here, will you be seated? Brandy on the table over there. Pour them some brandy, Commander. Make yourselves comfortable. It's a rather longish story."

He sat down behind his desk, reached out toward a pile of file folders, and took an envelope out of the top one.

"Here's the picture: Zwinge was a busy man. Had a great many things to keep an eye on. Being Chief Forensic Sorcerer for the City of London would be a full-time job for an ordinary man." He looked at Lord Bontriomphe. "Be frank, m'lud. Did you ever suspect that he was working for the Naval Intelligence Corps?"

"Never," Bontriomphe admitted, "though Heaven knows he worked hard enough. He was always busy, and he was one of those men who think that anything more than five hours sleep a night is an indication of sloth. Tell me, Captain, did My Lord Marquis know?"

"He was never told," said Captain Smollett. "Zwinge did say that he suspected that My Lord de London was aware of his Navy work, but if so he never mentioned it."

"He wouldn't," said Lord Bontriomphe.

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"No, of course not. At any rate, Zwinge had a great many irons in the fire. More things going on in Europe than just this one affair, I can assure you. Nonetheless, he felt it necessary to go to this Healers and Sorcerers Convention. Look odd if he didn't, he said, what with his being right here in London and all. But of course he kept right on working, even there."

"That is undoubtedly why he put the special spell on the lock of his hotel room," said Lord Darcy.

"No doubt, no doubt," agreed Captain Smollett. "At any rate, yesterday morning he sent this letter to me by messenger from the hotel." He handed the envelope to Lord Darcy. "You'll notice it is stamped 7:45 a.m."

Lord Darcy looked at the outside of the envelope. It was addressed to Captain Percy Smollett and was marked "Personal." Darcy opened it and took out the single sheet of paper. "This is in code," said Lord Darcy.

"Of course," said Captain Smollett. He took another sheet from the file and handed it over. "Here is the clear," he said. Lord Darcy read the message aloud:

" 'Sir: I have a special packet for you containing information of the utmost importance which I have just received. It is impossible for me to leave the hotel at this time, and I do not wish to entrust this information to a common messenger. Accordingly, I have given the envelope with my seal upon it to the hotel manager, Goodman Paul Nichols. He has placed it in the hotel safe and has been instructed to hand it over to your courier.' "

The note was signed with the single letter "Z".

Lord Darcy handed the papers back to the captain. "I see, Captain. Pray continue."

"As I said, the message arrived at 7:45. It was placed on my desk with the rest of my morning mail. Now—I didn't arrive here at the office until a few minutes before ten. Hadn't had time to even glance at my mail when Commander Ashley came in, bringing the news from Cherbourg that Barbour had been murdered—which was bad enough—and the further intelligence that Master Sir James had been stabbed to death only half an hour before. Since you already know of the importance we've attached to this affair, you'll understand that for the next few hours I was a very busy man. Didn't have a chance to look at my mail until well after two o'clock. When I decoded the letter, I sent Ashley, here, over to fetch the packet." He looked at the Commander. "You'd better take it from there, Commander. I'm sure Lord Darcy prefers to get his facts as directly as possible."

"Aye, sir." He turned to face Lord Darcy. "I went directly to the hotel and asked to see Goodman Lewie, and told him that Sir James

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had left an envelope addressed to Captain Smollett in the safe, to be delivered to the Navy.

"He said he knew nothing of it, and I told him that it had been left with Goodman Paul.

"He informed me that Goodman Paul had made no mention of it when he went off duty at nine, but he agreed to open the safe and get the envelope out.

"I was standing by him when he opened the safe. It's a small one and there wasn't much inside it. Certainly there was no envelope addressed to Captain Smollett, nor any sign that there had ever been one. Bolmer swore that he had not opened the safe that morning, and both of the desk clerks substantiated that. Bolmer and his two assistant managers are the only ones who know the combination, and the security spell only allows the assistant managers to open the safe during the time they are on duty, that is, from three p.m. till midnight for the afternoon manager and from midnight to nine a.m. for the night manager."

Lord Darcy nodded. "That does rather narrow it down to Goodman Paul. Only he could have removed that packet from the safe."

"My thought exactly," said Commander Lord Ashley. "Naturally, I insisted upon speaking to Paul Nichols immediately, and asked for his home address. It turns out that he lived there in the hotel; he has a room up on the top floor. Bolmer took me up and I knocked on Nichols' door, got no answer, and Bolmer let us in with a pass key. Nichols wasn't in. His bed was made and certainly didn't look as though it had been slept in. Bolmer said that was odd because usually Nichols goes out to have a bite to eat after he gets off work, then comes back to the hotel and sleeps until around six o'clock."

"Did you find out whether Nichols took advantage of the hotel's maid service?" Lord Darcy asked.

The Commander nodded. "He did. Nichols quite often went out of an evening, and the maid had orders to make up his room between 7:30 and 8:30. I looked the room over and checked through his things. He didn't seem to have packed anything. His suitcase, empty, was in the closet, and Bolmer said that as far as he knew it was the only suitcase Nichols owned."

"That's the advantage of being a counterspy," said Lord Bontriomphe with a sigh. "If an Officer of the King's Peace tried searching a man's room without a warrant he'd find himself in the Court of the King's Bench trying to explain to My Lord Justice how he had come to make such a mistake."

"Well, I didn't really search the place," Ashley said. "I was just taking a look around."

"So," said Lord Darcy, "you found that Nichols was not there and apparently had not been to bed

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since the bed was made on the previous evening."

"Right. I questioned some of the hotel servants. No one had seen him come back from his breakfast—or perhaps for him it was supper—so I instructed Bolmer to say nothing but to let us know as soon as Nichols returned. Then I came back here and reported to Captain Smollett."

Lord Darcy nodded and looked back at the captain.

"Been looking for him ever since. Sent men over to the hotel, to wait for him to come to work at midnight; he didn't show up. Still no sign of him. Not a trace."

"You suspect then," said Lord Darcy, "that the disappearance of the packet and the disappearance of Nichols are linked. I agree with you. The contents of that envelope would have been in code, would they not, Captain?"

"Yes indeed. And not the simple code used for that note, either. Furthermore, Zwinge always used ink and paper with a special spell on it. If an unauthorized person broke the seal, the writing would vanish before he could get the paper out of the envelope."

"Obviously, then, Nichols did not remove it from the safe, read it over, and decide that it was valuable on the spur of the moment."

"Obviously not," agreed Captain Smollett. "Furthermore, Zwinge was no fool. Wouldn't have given it to Nichols unless he trusted him. Also, since the envelope had that protective spell on it, the only way to read the contents would be to get it to a magician who is clever enough and powerful enough to analyze and nullify Master Sir James Zwinge's spell."

"Do you have any idea what sort of information might have been in that envelope, Captain Smollett?" Lord Darcy asked.

"None. None whatsoever. Can't have been terribly urgent—that is, not requiring immediate action—or Zwinge would have brought it here himself, in spite of everything. But it was certainly important enough to drive King Casimir's agents to murder to get it."

"How do you think this ties in with the murder of Barbour, then? And with the Navy's new secret weapon?"

The captain scowled and puffed at his pipe for a few seconds."Now there we're on shaky ground. Obviously it was discovered that Barbour was a double agent; otherwise he wouldn't have been killed."

"I agree with you there," said Lord Darcy.

"Very well. But that leaves us several possible speculations about FitzJean and about the Poles' knowledge of the confusion projector.

"If, as we hope, they know nothing of the device, then they knew nothing about FitzJean except the purely mendacious material which Barbour had passed on to them.

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When they discovered he was a double agent, they simply killed him and ignored FitzJean. Information on fleet disposition isn't worth taking any great pains over.

"However, I am afraid that we would be unrealistically optimistic to put any faith in the notion that the Polish Government is entirely unaware of the existence of the confusion projector.

"Much more likely, they are sparing no effort to find out what it is and how it works—which would still indicate that they know nothing whatever about FitzJean. If they did, they would certainly not have killed Barbour until they could get their hands on FitzJean—which, of course, they may have done. Or again they may already have the secret and not give two hoots in Hell about FitzJean.

"And finally, there is the possibility that FitzJean was himself a Polish agent sent in to test Barbour. When they discovered that Barbour's output to them differed drastically from what they knew the input to be, his death warrant was sealed."

Captain Smollett spread his hands. "But these are mere speculations; they tell us nothing. Important thing right now's to get our hands on Paul Nichols. Would have given you this before, but, as I said, there's actually nothing we can hold Nichols on. Can't prove that envelope ever existed, much less that he stole it. So how could we turn the matter over to Officers of the King's Peace?"

"My dear Captain, you should study something besides Admiralty law. Fleeing the scene of a crime is always enough evidence to warrant asking for a man's arrest and detention for questioning. Now the first question any investigator asks himself is: Where would the suspect go? To the Polish Embassy?"

Smollett shook his head. "No. There's a twenty-four hour watch on everyone entering or leaving the Polish Embassy."

"Exactly. I know that. So do the Poles. But the local headquarters for this Polish espionage ring is somewhere in the City. Where?"

"Wish I knew," said the captain. "Give half a year's pay for that information. We have reason to believe that there are at least three separate rings operating here in London, each unknown to the others, or at least known only to a select few. We know some of the agents, of course. We keep an eye on 'em; I've had my men watching every known agent in London for the past eighteen hours. So far, no news. But what we do *not* know is where any of their headquarters might be. Hate to admit it, but it's true. We have no hint, no suggestion, no clue of any kind."

"Then the only way to find Nichols," Lord Darcy said, "is to comb London for him. And that requires legwork. While your men are searching for him covertly, Lord

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Bontriomphe and the Armsmen of London can be looking for him for questioning on the charge of fleeing the scene of a crime."

Bontriomphe nodded. "We can have a net out for him within an hour. If we find anything, Captain, I'll let you know immediately."

"Very good, m'lud."

"I'd better get started on it," Bontriomphe said, getting to his feet. "The quicker the better. If you need to contact me for any reason, Captain, send word to the Royal Steward. We have set up our headquarters there; there will be a Sergeant-at-Arms on duty at all times, and I shall be checking in there regularly."

"Excellent. Thank you, m'lud."

"I shall see you later, gentlemen. Good day." Lord Bontriomphe walked out the door as if he were pleased at the prospect of finally having something he could sink his teeth into.

"As for me, Captain," said Lord Darcy, "I should like to ask your indulgence in what I know may be a touchy matter."

"What might that be?"

"I should like to have a look at your secret files, most especially at the letters from Barbour concerning FitzJean and the confusion projector."

"M'lud," said Captain Smollet with a wintery smile, "any Intelligence organization is justly jealous of its secret files and our Corps is no exception. Until now, these files have been classified *Most Secret.* Barbour's existence as a double agent was known only to the high echelons of the Admiralty. But you've taken me to task once for withholding information. Won't happen again. I shall have the pertinent files brought in so that both you and Commander Ashley can study them. And may *I* ask *your* indulgence?"

"Certainly, Captain, what is it?"

"With your permission, I'd like to make Commander Lord Ashley the liaison officer between the civilian investigators and the Navy. To be more specific, between you and me. He knows the Navy, he knows Intelligence work, and he knows something about criminal investigation. He was in the Naval C.I.D. before he was transferred to this Corps. His orders will be to assist you in every possible way. You agree, m'lud?"

"Of course, Captain. A splendid idea."

"Very well, Commander; those are your orders then."

"Aye, aye, Captain." He smiled at Lord Darcy. "I'll keep out from underfoot as much as possible, my lord."

"That's settled, then," said Captain Smollett, getting to his feet. "Now I'll go get those files."

Master Sean O Lochlainn stood near the closed door of the murder room and surveyed its entire con-

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tents. Then he turned to Journeyman Sorcerer Lord John Quetzal who stood next to him. "Now, d'ye understand what we have to be careful of? We are not yet ready to take the preservative spell off the body, so we have to be careful that none of the spells that we're working with inside the room interfere with it. D'ye understand?"

Lord John Quetzal nodded. "Yes, Master, I think I do."

Master Sean smiled at him. "I think you do, too, my lad. You followed through on the blood tests beautifully." He paused. "By the bye, d'ye think you could do them by yourself next time, should you happen to be called upon to perform them?"

Lord John Quetzal glanced sideways at the little sorcerer. "The blood tests? Yes, Master Sorcerer, I think I could," he said firmly.

"Ah, good." Master Sean nodded with satisfaction. "*But*"— he raised a warning finger—"this next one's a little tougher.

"We're dealing here with psychic shock. Now, whenever a man's hurt, or when he dies, there's psychic shock—unless, of course, he just fades away in his sleep or something like that.

"But *here* we're talking about violence."

"I understand," said Lord John Quetzal.

"All right. Now, you're going to be my thurifer. The ingredients are laid out on the table. Now I'll ask *you* to prepare the thurible, seeing as how it's you that's got to use it."

"Very well, Master," said the young Mechicain nobleman, with the tiniest trace of uneasiness in his voice.

On the table near the door sat the instrument which Master Sean had taken from his symbol-decorated carpetbag. It was a brazen pot with a perforated brazen cap, which, when assembled, would swing from the end of a clutch of chains some three feet long. Now, it was open, on the table.

Lord John Quetzal took several tools from his own carpetbag. Under the watchful eye and sharp ear of Master Sean O Lochlainn, the young sorcerer prepared the contents of the thurible.

After placing the brazen pot on an iron tripod, he fired up several lumps of charcoal in the bottom of it. Then, from the row of jars and bottles which had been lined up on the table, he took various ingredients and put them into his special golden mixing bowl, using a small golden spoon. With his own pencil-sized golden wand, he cast a spell over each ingredient as he added it, stirring it into the mixture.

There was frankincense and sweet balsam, samonyl and fenogreek, turmeric and taelesin, sandalwood and cedarwood, and four other lesser known but even more powerful ingredients—added in a precise order, each with its unique and individual spell.

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And when he had finished the mixing, and cast the final spell, the journeyman sorcerer lifted his head and turned his dark eyes to the tubby little Master.

Sean O Lochlainn nodded his head. "Very well done. *Very* well done." He smiled. "Now I'll not ask you if you know what you've done. It's a habit of mine to assume that a student lacks knowledge. Being, as it were, a student meself, I know how much knowledge I lack. And besides," he chuckled, "as Lord Darcy would tell you, I'm a man who's fond of lecturing.

"The spell we're about to perform is a dynamic spell, and must be warded off by a dynamic spell —which means that in order to protect the body I'll have to be working while you are censing the room. D'ye understand, my lad?"

"I do, Master."

"Very well. Now, when you place that mixture into the thurible, there will be given off a smoke, which is composed of many different kinds of small particles. Because of the spell you've cast on them, these particles will tend to be walls and the furniture in this room attracted to, and adhere to, the in a particular manner.

"They will form what we call holograph patterns upon the surfaces they touch. Each of the different kinds of smoke particles, forms its own pattern according to the psychic influences which have been impressed upon those surfaces. And by understanding the totality of those patterns we may identify definitely those psychic impressions."

He folded his arms on his chest, looked up at the tall young Mechicain, and gave him his best Irish grin. "Ah, lad, you're the kind of student a man looks for. You listen when the old master talks, and you don't get bored by what you already know, because you're waiting for more information."

Again, that almost invisible flush colored John Quetzal's dark skin. "Yes, Master Sean," he said carefully, "I have learned pattern theory."

"Aye—pattern *theory* you've learned. But you're wise enough to admit that you know only theory, not practice." He nodded his head in satisfaction. "You'll make a fine forensic sorcerer, lad. A *fine* forensic sorcerer!" Then his smile twisted slightly. "That is, you have the right attitude, me lad. Now we'll see if you have the technique."

He turned away from Lord John Quetzal and looked again at the walls. "If you do this thing right, Lord John Quetzal, there will be, upon those walls, patterns in smoke particles, each individual pattern distinguished by the spell cast on the various substances, and the holograph patterns distinguished by the combination of those spells. No man without the Talent will see anything but slightly smudgy walls

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—if that. You and I will see the patterns, and I'll do my best to show you how to interpret them."

He turned again.

"Are you ready, my lad?"

Lord John Quetzal set his lips. "I'm ready, Master."

"Very well, then."

Master Sean took two wands from his symbol-decorated carpetbag, walked over to the corpse which lay near the edge of the desk, and stood over it. "I'm ready, lad. Go ahead. Watch your spells.

The young Mechicain blew gently on the lumps of charcoal in the bottom of the thurible until they flared red-orange, then, his lips muttering a special spell, he poured the aromatic contents of the golden cup over the glowing coals. Immediately a dense cloud of white smoke rose toward the ceiling. Lord John Quetzal quickly fitted the perforated cap down over the bowl, locked it in place, and picked up the thurible by its clutch of chains. His left hand held the end of the chains, his right hand held them about halfway down, allowing the thurible to swing free. He moved over to the nearest wall, swinging the censer in a long arc, allowing the dense smoke to drift toward it.

He moved along the wall step by step, swinging the thurible rhythmically, his lips moving in time with it, and the dense smoke drifted along the walls and billowed upwards, spreading a clinging, heavy fragrance through the room.

While his assistant performed the censing, the Master Sorcerer stood immobile over the body, a long wand of glittering crystal in each hand, his arms flung wide to provide the psychic umbrella which would protect the corpse from being affected by the magical ritual that John Quetzal was enacting.

The Irish sorcerer's pose did not seem strained. There was an aura of strength about him; he seemed taller, somehow; and his thick torso had an appearance of hardness about it. The light from the gas lamp glittered and flickered in the depths of the two crystal wands, flashing sparkling rainbows about the room.

The smoke from the censer avoided the area under Master Sean's control. It billowed in great clouds, but there seemed to be an invisible force that kept that portion of the room totally clear of the tiny particles. Those microscopic bits of fragrant ash moved toward walls, furniture and ceiling, each clinging in its individual way—but none came near the powerful figure of the Master Sorcerer who shielded one area of evidence from their effect.

Three times, the young sorcerer made the circuit of the room with his swinging thurible, and except for that one specially protected area, the air grew dimly blue with smoke.

Then, while Master Sean still remained unmoving, he went back to

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the table, placed the hot, smoking thurible on the iron tripod, removed the perforated cap, and replaced it with a solid cap which cut off the flow of smoke and smothered the burning coals.

From his own symbol-decorated carpetbag, he took a silver wand with a knoblike thickening at one end. Grasping it by the other end, he turned and traced symbols in the air toward each wall in turn.

As he did so, the fog of smoke moved even more strongly toward the walls, and the air quickly cleared.

After a moment, Lord John Quetzal softly said: "It is finished, Master."

Master Sean looked around the room, lowered his arms, walked over and put the two crystal wands back in his carpetbag. Then he surveyed the room once more.

"A fine job, my lad," he said. "Indeed a fine job. Now, can you tell me what happened here?"

Lord John Quetzal looked. Although both sorcerers were using their eyes, it was not their eyes with which they saw. To a man without the Talent, the psychic patterns wrought by the acts which had taken place within the room, and brought out by the censing process, would have been totally invisible. To a man with the Talent they were quite clear.

But while Lord John Quetzal could perceive the patterns, he had not yet had enough training to interpret them. Master Sean sensed his hesitation. "Go ahead, lad," he said. "Rely on your hunches. Make a guess. 'Tis the only way you can check on your perceptions, and thereby progress from supposition to certainty."

"Well," Lord John Quetzal began uncertainly, "it looks like—" He stopped, then said: "But of course that's ridiculous. It just couldn't be that way."

Master Sean let out his breath in an exasperated manner. "Oh, lad, lad! You're trying to second-guess yourself. You're trying to make a *logical* interpretation before you've subjectively absorbed the data. Now I'll ask you again. What does it seem to you happened?"

Lord John Quetzal took another look. This time he pivoted slowly, turning a full three hundred and sixty degrees, taking in every bit of his surroundings. Then, carefully, he said: "There was no one else in this room but Sir James . . ." He hesitated.

"That's correct, absolutely correct," said Master Sean. "Go on. You still haven't said what it is that looks paradoxical."

Lord John Quetzal said, in a faintly puzzled voice, "Master, it looks to me as though Sir James Zwinge were killed twice. Several minutes—perhaps as much as half an hour—intervened between the murders."

Master Sean smiled and nodded.

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"You almost have it, lad. I think the results of the autopsy will bear you out. But you haven't analyzed the full significance of what is there." He made a broad sweeping gesture with his arm. "Take a good look at what the patterns show. There are two strong patterns superimposed chronologically. Two successive psychic shocks occurred while our late colleague was alone in this room. And, as you've pointed out, they were separated in time by half an hour. The first, d'you see, was when he was *killed;* the second occurred when he *died.*"

XIII

The broad doors that led from the lobby of the Royal Steward Hotel to the main ballroom were closed but not locked. There was no sign upon the door that said *Convention Members Only;* at a Sorcerers Convention such signs were unnecessary. The spell on those doors was such that none of the lay visitors who were so eagerly thronging to the displays in the lobby would ever have thought of entering them—or, if the thought did occur to them, it would be dismissed in a matter of seconds.

Sir Thomas Leseaux and the Dowager Duchess of Cumberland pushed through the swinging doors. A few feet inside the ballroom Lady de Cumberland stopped and took a deep breath.

"Trouble, Your Grace?"

"Good Heavens, what a mob!" said Mary de Cumberland. "I feel as though they're breathing up all the fresh air in London."

The ballroom presented a picture that was both peaceful and relaxed in comparison with the lobby. The room was almost the same size but contained only a tenth as many people. And instead of the kaleidoscopic variety of color in the costumes displayed in the lobby, the costumes in the ballroom were of a few basic colors. There was the dominating pale blue of the Sorcerers, modified by the stark black-and-white of the priestly Healers, and the additional touch of episcopal purple. The dark rabbinical dress of the occasional Jewish Healer was hardly distinguishable from that of a priest, but an occasional flash of bright color showed the presence of a very few *Hakime,* Healers who were part of the entourages of various Ambassadors from the Islamic countries.

"Visitors Day," said Sir Thomas, "is simply something we must put up with, Your Grace. The people have a right to know what the Guild is doing; the Guild has the duty to inform the people."

Mary turned her bright blue eyes up to Sir Thomas' face. "My dear Sir Thomas, there are many acts that human beings must perform which are utterly necessary. That does not necessarily mean that they are enjoyable. Now, where is this lovely creature of yours?"

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"A moment, Your Grace, let me look." Sir Thomas, who was a good two inches taller than the average, surveyed the ballroom. "Ah, there she is. Come, Your Grace."

The Dowager Duchess followed Sir Thomas across the floor. The Demoiselle Tia was surrounded by a group of young, handsome journeymen. Mary of Cumberland smiled to herself. It was obvious that the young journeymen were not discussing the Art with the beautiful apprentice. Her 'prentice's smock was plain pale blue, and was not designed to be alluring, but on the Demoiselle Tia . . .

And then the Dowager Duchess noticed something that had escaped her attention before: the Demoiselle Tia was wearing arms which declared her to be an apprentice of His Grace, Charles Archbishop of York.

To Mary of Cumberland, the Demoiselle Tia appeared somewhat taller than she had when the Duchess saw her leaving Master Sir James' room on the previous morning. Then she saw the reason. Tia was wearing shoes of fashion that had arisen in the southern part of the Polish Hegemony and had not yet been accepted in the fashion centers either of Poland or of the Empire. They were like ordinary slippers except that the toes came to a point and the heels were lifted above the floor by a spike some two-and-a-half inches long. *Good Heavens,* thought Mary to herself, *how can a woman wear such high heels without ruining her feet?*

Was it, she wondered, some psychological quirk? Tia was a tiny girl, a good inch less than five feet tall without those outer heels, and a good foot shorter than the Dowager Duchess of Cumberland. Did she wear those heels simply to increase her physical height?

No. Mary decided; Tia had too much self-assurance, too much confidence in her own abilities, to need the false prop of those little stilts. She wore them simply because they were the fashion she had become used to. They were "native costume," nothing more.

"Excuse me," said Sir Thomas Leseaux, pushing his way through the crowd that surrounded Tia. Every one of the journeymen looked thrice at Sir Thomas. Their first look told them that he did not wear the blue of a sorcerer. *A layman, then?* Their second look encompassed the ribbons on his left breast which proclaimed him a Doctor of Thaumaturgy and a Fellow of the Royal Thaumaturgical Society. *No, not a layman.* Their third look took in his unmistakable features, which identified him immediately as the brilliant theoretical sorcerer whose portrait was known to every apprentice of a week's standing. They stepped back, fading away from Tia in awe at the appearance of Sir Thomas.

Tia had noticed that the hand-

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some young sorcerers who were paying court to her seemed to be vanishing, and she looked up to discover the cause of the dispersion. Mary de Cumberland noticed that Tia's eyes lit up and a smile came to her pixieish face when she saw the tall figure of Sir Thomas Leseaux.

Well, well, she thought, *so Tia reciprocates Sir Thomas' feelings.* She remembered that Lord Darcy had said "Sir Thomas is in love with the girl—or thinks he is." But Lord Darcy was not a Sensitive. Since she herself was sensitive to a minor degree, she knew that there was no question about the feeling between the two.

Before Sir Thomas could speak the Demoiselle Tia bowed her head. "Good afternoon, Sir Thomas."

"Good afternoon, Tia. I'm sorry to have dispersed your court.

"Your Grace," continued Sir Thomas, "may I present to you the Demoiselle Tia. Tia, I should like you to know my friend, Mary, Duchess of Cumberland."

Tia curtsied. "It is an honor to meet Your Grace."

Then Sir Thomas looked at his watch and said, "Good Heavens! It's time for the meeting of the Royal Thaumaturgical Society." He gave both women a quick, brief smile. "I trust you ladies will forgive me. I shall see you later on."

Mary de Cumberland's smile was only partly directed towards Tia. The rest of it was self-congratulatory. Lord Darcy, she thought, would approve of her timing; by carefully checking the meeting time of the R.T.S., she had obtained an introduction by Sir Thomas and his immediate disappearance thereafter.

"Tia," she said, "have you tasted our English beer? Or our French wines?"

The girl's eyes sparkled. "The wines, yes, Your Grace. English beer? No." She hesitated. "I have heard they compare well with German beers."

Her Grace sniffed. "My dear Tia, that is like saying that claret compares well with vinegar." She grinned. "Come on, let's get out of this solemn conclave and I'll introduce you to English beer."

The Sword Room of the Royal Steward was, like the lobby, thronged with visitors. In one of its booths, the Dowager Duchess of Cumberland lifted the chilled pewter mug.

"Tia, my dear," she said, "there are many drinks in this world. There are wines for the gourmet, there are whiskies and brandies for the men, there are sweet cordials for the women, and there are milk and lemonade for children—but for good friendly drinking, there is

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nothing that can compare with the honest beer of England."

Tia picked up her own mug and touched it to Mary's. "Your Grace," she said, "with an introduction like that, the brew of England shall be given its every opportunity."

She drank, draining half the mug. Then she looked at Mary with her sparkling pixie eyes. "It *is* good, Your Grace!"

"Better than our French wines?" asked Mary, setting down her own mug half empty.

Tia laughed. "Right now, much better, Your Grace; I was thirsty."

Mary smiled back at her. "You're quite right, my dear. Wine is for the palate—beer is for the thirst."

Tia drank again from her mug. "You know, Your Grace, where I come from, it would be terribly pre-

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sumptuous for a girl of my class even to sit down in the presence of a duchess, much less to sit down and have a beer with her in a public house."

"Fiddle!" said Mary de Cumberland. "I'm not a Peer of the Realm; I'm as much a commoner as you are."

Tia shook her head with a soft laugh. "It would make no difference, Your Grace. *Anyone* with a title is considered infinitely far above a common person like myself—at least, in the province of Banat, which, I confess, is all of the Polish Hegemony I have ever seen. So when I hear the title 'Duchess', I automatically give a start."

"I noticed," said Mary, "and I point out to you that anyone who aspires to a degree in Sorcery had better learn to handle symbols better than that."

"I know," the girl said softly. "I intend to try very hard, Your Grace."

"I'm sure you will, my dear." Then, changing the subject quickly: "Tell me, where did you learn Anglo-French? You speak it beautifully."

"My accent is terrible," Tia objected.

"Not at all! If you want to hear how the language *can* be butchered, you should hear some of our Londoners. Whoever taught you did very well."

"My Uncle Neapeler, my father's brother, taught me," Tia said. "He is a merchant who spent a part of his youth in the Angevin Empire. And Sir Thomas has been helping me a great deal—correcting my speech and teaching me the proper manners, according to the way things are done here."

The Duchess nodded and then gave Tia a quick smile. "Speaking of Sir Thomas—I hope his title doesn't make you frightened of him."

The sparkle returned to Tia's eyes. "Frightened of Sir Thomas? Oh, Your Grace, *no!* He's been so good to me. Much better than I deserve, I'm sure.

"But, then, everyone has been so good to me since I came here. Everyone. Nowhere does one find the friendliness, the *good*ness that one finds in the realm of His Majesty King John."

"Not even in Italy?" The Dowager Duchess asked casually.

Tia's expression darkened. "They might have hanged me in Italy."

"Hanged you? My dear, what on earth for?"

After a moment's silence, the girl said: "It's no secret, I suppose. I was charged with practicing the Black Art in Italy."

The Dowager Duchess of Cumberland nodded gravely. "Yes. Go on. What happened?"

"Your Grace, I have never been able to stand by and watch people suffer. I think it is because I watched both my parents die when

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I was very young—within a few months of each other. I wanted so very much for them both to live, and there was nothing I could do. I was—helpless to do anything for them. All children experience that terrible feeling of helplessness at times, Your Grace—but this was a very special thing." There was a heavy somberness in her dark eyes.

Mary de Cumberland said nothing, but her sympathy was apparent.

"I was brought up by Uncle Neapeler—a kind and wondrous man. He has the Healing Talent, too, you see, but it is untrained." Tia was looking back down at her beer mug, running one tiny, dainty finger around and around its rim. "He had no opportunity to train it. He might never have known that he possessed it if he had not spent so many years of his life in the Angevin Empire, where such things are searched out. He found that I had it, and taught me all he knew—which was small enough.

"In the Slavonic States, a man's right to become a Healer is judged by his political connections and by his ability to pay. And the right to have the services of a trained Healer is judged in the same way. Uncle Neapeler is—*was*—a merchant, a hard man of business. But he was never rich except in comparison to the villagers, and he was politically suspect because of the time he had spent in the Imperial domains.

"He used his Talent, untrained as it was, to help the villagers and the peasants when they were ill. They all knew they could rely on him for help, no matter who they were, and they loved him for it. He brought me up in that tradition, Your Grace."

She stopped, compressed her lips, and took another drink from her mug. "Then—something happened. The Count's officers . . ." She stopped again. "I don't want to talk about that," she said after a moment. "I . . . I got away. To Italy. And there were sick people there. People who needed help. I helped them, and they gave me food and shelter. I had no money to support myself. I had nothing after . . . but never mind. The poor helped me, for the help I could give them. For the children.

"But those who did not know called it Black Magic.

"First in Belluno. Then in Milano. Then in Torino. Each time, the whisper went around that I was practicing the Black Art. And each time, I had to go on. Finally, I had to flee the Italian States altogether.

"I got across the Imperial border and went to Grenoble. I thought I would be safe. I thought I could get a job of some kind—apprentice myself as a lady's personal maid, perhaps, since it is an honored profession. But the Grand Duke of Piemonte had sent word ahead, and I was arrested by the Armsmen in Grenoble.

"I was frightened. I had broken

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no Imperial law, but the Piemontese wanted to extradite me. I was brought before my lord the Marquis of Grenoble, who heard my plea and turned the case over to the Court of Justice of His Grace the Duke of Dauphine. I was afraid they would just hand me over to the Piemontese authorities as soon as they heard the charge. Why should anyone listen to a nobody?"

"Things just aren't done that way under the King's Justice," said the Dowager Duchess.

"I know," said Tia. "I found that out. I was turned over to a special ecclesiastical commission for examination." She drank again from the mug and then looked straight into Mary of Cumberland's eyes. "The commission cleared me," she said. "I had practiced magic without a license, that was true. But they said that that was not an extraditable offense under the law. And the Sensitives of the commission found that I had not practiced Black Magic in my healing. They warned me, however, that I must not practice magic in the Empire without a license to do so.

"Father Dominique, the head of the commission, told me that a Talent such as mine should be trained. He introduced me to Sir Thomas, who was lecturing at a seminar for Master Sorcerers in Grenoble, and Sir Thomas brought me to England and introduced me to His Grace the Archbishop of York.

"Do you know the Archbishop, Your Grace? He is a saint, a perfect saint."

"I'm sure he'd be embarrassed to hear you say so," said the Duchess with a smile, "but just between us, I agree with you. He is a marvelous Sensitive. And obviously"—she gestured toward the archiepiscopal arms on Tia's shoulder—"His Grace's decision was favorable. Quite favorable, I should say."

Tia noded. "Yes. It was through the recommendation of His Grace that I was accepted as an apprentice of the Guild."

Mary de Cumberland could sense the aura of dark foreboding that hung like a pall around the girl. "Well, now that your future is assured," she said warmly, "you have nothing to worry about."

"No," said Tia with a little smile. "No. Nothing to worry about." But there was bleakness in her eyes, and the pall of darkness did not dissipate.

At that moment, the waiter reappeared and coughed politely. "Your pardon, Your Grace." He looked at Tia. "Your pardon, Demoiselle. Are you Apprentice Sorcerer Tia . . . uh . . . Einzig?" He hit the final *g* a little too hard.

Tia smiled up at him. "Yes, I am. What is it?"

"Well, Demoiselle, there's a man at the bar who would like to speak to you. He says you'll know him."

"Really?" Tia did not turn to look. She raised an eyebrow. "Which one?"

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The waiter did not turn, either. He kept his voice low. "The chap at the bar, Demoiselle, on the third stool from the right; the merchant in the mauve jacket."

Casually, Tia shifted her eyes toward the bar. So did the Dowager Duchess. She saw a dark man with bristling eyebrows, a heavy drooping moustache, and deep-set eyes that darted about like a ferret's. The jacket he wore was of the oddly-cut "Douglas style," which was a strong indication that he was a Manxman, since the style was very little favored except on the Isle of Man.

She heard Tia gasp, "I . . . I'll speak to him. Would you excuse me, Your Grace?"

"Of course, my dear. Waiter, would you refill our mugs?"

Mary watched as Tia rose and walked over to the bar. She could see the stranger's face and Tia's back, but in the hash of emotion that was washing back and forth through the room, it was impossible to interpret Tia's emotions. As for the stranger, there was no way for her to catch his words. His face seemed immobile, his lips seemed hardly to move, and what movements they did make were covered by the heavy moustache. The entire conversation took less than two minutes. Then the stranger bowed his head to Tia, rose, and walked out of the Sword Room.

Tia stood where she was for perhaps another thirty seconds. Then she turned and came back to the booth where the Dowager Duchess of Cumberland waited. On her face was a look which Mary could only interpret as grim joy.

"Excuse me, Your Grace," she said. "A friend. We had not seen each other for some time." She sat down and picked up her tankard.

Then she said suddenly, "Pardon me, Your Grace. What o'clock is it?"

Mary looked at the watch on her wrist. "Twelve after six."

"Oh, dear," said Tia, "Sir Thomas told me specifically that I should wear evening costume after six."

Mary laughed. "He's right, of course. We should both have changed before this."

Tia leaned forward. "Your Grace," she said confidingly, "I must admit something. I'm not used to Angevin styles. Sir Thomas was good enough to buy me some evening dresses, and there is one in particular I have never worn before. I should like to wear it tonight, but" —her voice sank even lower—"I don't know how to wear the thing properly. Would Your Grace be so good as to come up and help me with it?"

"Surely, my dear," Mary said with a laugh, "under one condition."

"What's that, Your Grace?"

"The dress I have to wear normally requires a battalion of assistants to get it on. Do you think you can substitute for a battalion?"

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The statement was untrue; the Duchess was perfectly capable of dressing herself, but Lord Darcy had asked her to keep an eye on this girl and, even though she was not certain that it was still necessary, she would obey his orders.

"I can certainly try, Your Grace," said Tia, smiling. "My room is two flights up."

"Good, we'll go up and strap you into your finery, then go down one flight and strap me into mine. Between the two of us we'll have every sorcerer in the place groveling at our feet."

The Duchess signed the bill that the waiter presented, and the two women left the Sword Room.

Tia turned the key in the door to her room. She pushed open the door and stopped. On the floor, just beyond the door, was an envelope. She picked it up and smiled at the Duchess. "Excuse me, Your Grace," she said. "The dress I was telling you about is in the closet over there. I would like Your Grace to give me your opinion on it. It's the blue one."

Mary walked over to the closet, opened it, and looked at the array of dresses, but before she could say anything she heard Tia's voice behind her. She could not understand the words of the girl's short expletive, but she could feel the anger in them. Slowly she turned around and said, "What seems to be the trouble?"

"Trouble?" the girl's eyes flashed fire. Her right hand crumpled the envelope and then with a convulsive gesture threw it into the wastebasket nearby. "No trouble, Your Grace, no trouble at all." Her smile was forced. She walked over to the closet and looked at the dress. She stared at it without saying anything.

Mary of Cumberland stepped back. "It's a lovely dress, Tia," she said quietly. "You'll look magnificent in it." With one lightning-like movement she reached out to the wastebasket, grabbed the piece of paper Tia had thrown away, and slipped it into her pocket. "Yes," she said, "a very beautiful dress."

Mary could sense the girl's hesitation and confusion. Something in that note had upset her, had changed her plans, and now she was trying to think of what to do next.

Tia turned, a pained look on her face. "Your Grace, I don't . . . I don't feel well. I should like to lie down for a few minutes." For a moment, Mary de Cumberland thought she should offer her services as a Healer. Then she realized that that would simply add to the confusion. Tia had no headache. She simply wanted to get rid of her guest. There was nothing Mary could do.

"Of course, my dear. I understand. I shall," she smiled, realizing she was repeating Sir Thomas's words, "see you later on, then. Good evening, my dear."

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She went out into the hall and heard the door close behind her. *What now?* she thought. There was no way of intruding on Tia without making her intrusion obvious. What to do next?

She went down the stairs. Halfway down she took out the note that had been under Tia's door, the note she had retrieved from the wastebasket. She opened it and looked at it.

It was in a language she could not identify. Not a single word of it was understandable. The only thing that stood out was a number that was easily recognizable.

7:00.

Nothing else was comprehensible.

XIV

Lord Darcy leaned back in the hard, straight-backed chair that apparently epitomized Admiralty furniture and stretched his back muscles. "Ahhh-h-h . . ." he exhaled audibly. He felt as though weariness had settled into every cell of his body.

Then he leaned forward again, closed the folder on the table in front of him, and looked across the table at Lord Ashley.

"Doesn't tell us much, does it, my lord?"

Lord Ashley shook his head. "No, my lord. None of them do. The mysterious FitzJean remains as mysterious as ever."

Lord Darcy pushed the folder away from him. "Agreed." He drummed his fingers on the tabletop. "We have no clue from Barbour as to FitzJean's identity. The Admiralty staff at Cherbourg Naval Base did not even know of Barbour's existence. Unless something unexpected turns up, we will get no further information about FitzJean from that end."

"Do you see any clues at this end, my lord?"

"Well, look at the data." Lord Darcy gestured toward the pile of folders. "Only three men, presumably, know how to build and how to activate the confusion projector: Sir Lyon Grey, Sir Thomas Leseaux, and the late Sir James Zwinge. Of course, it is possible that that information was stolen from them, but let us explore the first possibility that suggests itself: Could it have been one of them?"

The Commander frowned. "It's hard to imagine that such respected and trusted men could betray the Empire."

"Indeed," said Lord Darcy. "It is difficult to imagine why *any* highly-placed officer could betray the Empire. But it has happened before, and we must consider the possibility.

"What about Sir Thomas, for instance? He worked out the theory and the mathematics for this device. What about Sir Lyon, or Sir James? They collaborated on working out the thaumaturgical engi-

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neering technique which made the device a working reality.

"If you had to pick one of the three, my lord, which would it be?"

The Commander leaned back in his chair and looked up, away from the low-hanging gas lamp, at the shadowed beams of the high ceiling.

"Well," he said after a moment, "first off, I'd eliminate Sir Thomas. Since the basic discovery was his, it would have been much simpler all around for him to have sold it directly to His Slavonic Majesty's Government in the first place, if he needed money that badly."

"Agreed," said Lord Darcy tonelessly.

"Sir Lyon," Commander Ashley continued, "has plenty of money in his own right. I don't say that a quarter of a million silver sovereigns would mean nothing to him, but it hardly seems enough to entice a man in his position to commit treason."

"Agreed," Lord Darcy repeated again.

"Sir James?" Ashley paused. "I don't know. Certainly he was not a wealthy man."

He stared at the ceiling for another twenty seconds, then lowered his head and looked at Darcy. "Here's a suggestion for you, my lord. I don't know how good it is, but we can try it for size."

"Proceed," said Lord Darcy. "I should be grateful for any light you may shed upon the subject."

"All right; suppose that Zwinge and Barbour were in this together. Naturally, to cover themselves, they would have to invent the mysterious FitzJean. No one ever saw FitzJean and Barbour together. Our agents saw him enter Barbour's place, and they saw him leave it. He came from nowhere and vanished into nowhere. What could be simpler than for Barbour himself to personate this mysterious being? Barbour, after all, actually did have contacts with Polish agents."

"Barbour wasn't Zwinge's only contact," Lord Darcy pointed out. "Why not use one of the others, and quietly sell the secret without all this play-acting?"

The Commander put his hand on the table, palm up. "What would happen if he did? As soon as the Royal Polish Navy was equipped with this device, we would find it out. We would know that one of those three men had sold it. Our first suspicion would naturally fall on Zwinge, because, of the three, only he was known to have had any contacts with Polish agents.

"After all, an ordinary man with a secret to sell can't simply say to himself, 'Well, I guess I'll just dot out and peddle it to a Polish agent.' Polish agents aren't that easy to find."

"True," Lord Darcy said thoughtfully. "It is difficult to sell something if you don't know how to get in contact with your customers. Pray continue."

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"Very well then. In order to divert suspicion from himself, he sets up this little playlet with Barbour. Everyone is looking for the mysterious FitzJean. A trap is laid for him. Meanwhile, Barbour is actually dealing with the Poles, giving them the same story about FitzJean."

"How was the playlet to end, then?" Lord Darcy asked.

"Well, let's see. The secret is given to the Poles. The Poles pay off Barbour. I imagine Zwinge would have found some excuse to be there at the same time. I doubt if he would have trusted Barbour with five thousand golden sovereigns.

"The trap for the mysterious FitzJean fails, of course, since there is no FitzJean, and—after we find that the Polish Navy has the confusion projector—Zwinge's excuse is: 'FitzJean must have become suspicious of Barbour and peddled the secret elsewhere.'

"Zwinge may have intended to pay off Barbour, to split the money with him, or he may have intended to kill him. We can't know which."

"Interesting," said Lord Darcy. "There is certainly nothing impossible about just such a plan having been conceived, but, if so, the plan did not come off. What, then, are your theories as to what actually *did* happen?"

"Personally," said the Commander, "I believe that the Poles discovered that Barbour was working for Zed, and that Zed was Sir James. Now then, if my hypothesis is anywhere close to the truth, there are at least two possible explanations for what happened.

"One: The Poles decided that the whole business about the confusion projector was mere bait for some kind of trap, a hoax cooked up for some reason by Sir James; so they sent out agents to eliminate both.

"Or, two: They had reason to believe that Sir James actually was a traitor and was ready to negotiate with them. They would know that Sir James wouldn't give the plans and specifications for the device to Barbour unless all the arrangements were made. But they would also know that he would have had to have those plans in a place where he could lay his hands on them quickly. He must have had them already drawn up and hidden somewhere; he could hardly have expected to be able to sit down and draw them from memory at the snap of a finger.

"So, while one group of agents is dealing with Barbour in Cherbourg, another is watching Zwinge in London. Arrangements for the payoff are made in Cherbourg, and Barbour sends this information to Zwinge. Zwinge, not knowing he is being watched by Polish agents, fetches the plans to send them to Barbour. But now, the Poles know where those plans are because Zwinge has taken them from their hiding place. They send orders to Cherbourg to dispose of Barbour, and the agents here kill Zwinge and

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grab the plans, thereby saving themselves five thousand golden sovereigns."

"I must admit," said Lord Darcy slowly, "that my lack of knowledge of international intelligence networks has hampered me. That theory would never have occurred to me. What about the actual mechanism of Sir James' murder? How did the Polish agents actually go about killing him?"

Commander Lord Ashley shrugged eloquently. "Now there you have me, my lord. My knowledge of black magic is nil, and, in spite of Captain Smollett's statement of my qualifications, I am forced to admit that my experience in the Naval C.I.D. never included a murder investigation."

Lord Darcy laughed. "Well, that is honest enough, anyway. I hope this investigation will allow you to see how we poor benighted civilians go about it. What o'clock is it?" He looked at the watch at his wrist. "Heavens! It's after six. I thought the Admiralty closed at six o'clock."

The Commander grinned. "I daresay Captain Smollett left word for us not to be disturbed."

"Of course," said Lord Darcy. "All right. Let's put these folders back in their files and go to the hotel. I want to ask Sir Lyon Grey some questions if we can get hold of him, and also I should like to speak to His Grace the Archbishop of York. We need to know more about a girl named Tia Einzig."

"Tia Einzig?" Lord Ashley blinked. The name was totally new to him.

"I'll tell you what little I know about her on the way over to the hotel. Will the Admiralty have transportation for us? Or will we have to find a cab?"

"I'm afraid the Admiralty coaches are all locked up at six, my lord," said the Commander. "We'll have to take a cab—if we can find one."

"If not, we can walk," said Lord Darcy. "It's not as if the Royal Steward were halfway across the city."

A few minutes later, they walked down the darkened corridors of the Admiralty offices. In the lobby, an armed Petty Officer let them out through the front door. "Awfully foggy out tonight, my lords," he said. "Trust you have a good ride. Captain Smollett left orders that a coach be waiting for you."

"Let us thank God for small favors," said Lord Darcy.

The fog was even heavier than it had been the night before. At the curb, barely visible in the dim glow of the gas lamp above the doors of the Admiralty Building, stood a coach bearing the Admiralty arms. The two men went down the steps to the curb. Commander Lord Ashley said:

"Petty Officer Hosquins, is that you?"

"Yes, My Lord Commander," came a voice from the driver's seat,

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"Captain Smollett told us to wait for you."

"Excellent. Take us to the Royal Steward, then." And the two men climbed into the coach.

It took longer to make the trip than it had earlier that afternoon. Most of the visitors, anticipating the fog, had gone home. Lord Darcy and Lord Ashley found the lobby almost deserted. A man wearing the silver-slashed blue of a Master Sorcerer was looking at one of the displays. Lord Darcy and Lord Ashley went over to him and Lord Darcy tapped him on the shoulder.

"Your pardon, Master Sorcerer," he said formally. "I am Lord Darcy, special investigator under a King's Warrant, and I would appreciate it if you could tell me where I might find Sir Lyon Gandolphus Grey."

The master sorcerer turned, an obsequious smile on his face. "Ah, Lord Darcy," he said. "It is indeed a pleasure to meet your lordship. I am Master Ewen MacAlister. My very good friend Master Sean O Lochlainn has told me a great deal about you, your lordship." Then his face fell in sudden gloom. "I am sorry to say, your lordship, that Grand Master Sir Lyon is unavailable at the moment. He is attending a Special Executive Session of the top officers of the Royal Thaumaturgical Society and the Sorcerers Guild. Can I do anything else to help your lordships?"

Lord Darcy refrained from pointing out that thus far he had done nothing at all to help their lordships. "Ah, that is too bad. But no matter. Tell me, is His Grace the Archbishop of York also attending that meeting?"

"Oh no, your lordship. His Grace is not a member of the Executive Committee. His ecclesiastical ties are much too onerous to permit him to take on the added burden. As a matter of fact, I saw His Grace only a few moments ago. He is taking his evening tea in the restaurant—in the Buckler Room, your lordship."

He lifted his hand and took a quick glance at his wristwatch. "Yes, that was only a few minutes ago, your lordships. His Grace should still be there.

"Tell me, is there anything else I can do to help your lordships?" Before either of them could answer, he went on, "Can I do anything that will aid you in apprehending the fiendish criminal who perpetrated the heinous murder of"—he suddenly looked very sad— "our good friend Master Sir James? A deplorable thing. Is your lordship prepared to make an arrest?"

"We shall do our best, Master Ewen," said Lord Darcy briskly. "We thank you for your information. Good evening, Master Ewen, and thank you again."

He and Lord Ashley turned and walked toward the restaurant, leaving Master Ewen MacAlister looking blankly after them.

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"Master Ewen MacAlister, eh?" said Lord Ashley.

"I should have known him, from Master Sean's description, even if he had not introduced himself."

"Is there any possibility, my lord," Lord Ashley said thoughtfully, "that Master Ewen is involved in the matter?"

Lord Darcy took two more steps before he answered the question. "I shall be honest with you," he said then. "Although I have no evidence, I feel it highly probable that Master Ewen MacAlister is one of the prime movers in the mystery which surrounds Sir James' death."

Lord Ashley looked surprised. "You didn't seem disposed to question him any further."

"I have read the statement he made to Lord Bontriomphe yesterday. He was in his room all that morning until ten or fifteen minutes after nine. He is not sure of the time. After that, he was down in the lobby. Master Sean corroborates a part of his testimony. The interesting thing, however, is that Master Ewen's room is on the floor above, and directly over, the room in which Sir James was killed."

"That *is* food for thought," said Ashley as they approached the door of the Buckler Room.

Lord Darcy pushed the door open and the two men went in. The courtyard outside, which had been visible that morning from Sir James' room, was now shrouded in fog, but the gas lamps gave bright illumination to the restaurant itself. The two men stopped and surveyed the room. At one table an elderly man in episcopal purple sat by himself, sipping tea.

Lord Darcy said, "That, I believe, is His Grace of York." They walked toward the table.

The Archbishop appeared to be deep in thought. He had a notebook on the table and was carefully marking down symbols upon its open pages.

"My apologies for this interruption, Your Grace," said Lord Darcy politely. "I would not willingly disturb your cogitations, but I come upon the King's Business."

The old man looked up with a smile, the light from the gas lamps making a halo of the silver hair that surrounded his purple skullcap. Without rising he extended his hand. "You do not interrupt, my lord," he said gently. "My time is yours. You are Lord Darcy from Rouen, I believe?"

"I am, Your Grace," said Lord Darcy, "and this is Commander Lord Ashley of the Imperial Naval Intelligence Corps."

"Very good," said the wise old Sensitive. "Please be seated, my lords. Thank you. You come then to discuss the problem propounded by the death of Sir James Zwinge."

"We do, Your Grace," said Lord Darcy, settling himself in his chair. His Grace of York folded his hands upon the table.

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"I am at your service. Anything that may be done to clear this matter up . . ."

"Your Grace is most kind," said Lord Darcy. "I am not, as you know, a Talented man," he began, "and there are, therefore, certain data which you may possess that I do not."

"Very probably. Such as what?"

"As I understand it, it would be difficult for a sorcerer to perform a rite of Black Magic within this hotel without giving himself away. Furthermore, every sorcerer here has been examined for orthodoxy of practice and carries a license signed by his diocesan bishop attesting to that examination."

"And so your question is," the Archbishop interjected smoothly, "how is it such a person could have escaped our notice."

"Precisely."

"Very well, I shall attempt an explanation. Let us begin with the license to practice. This license is given to an individual sorcerer when, upon completing his apprenticeship, he becomes qualified, according to the rules of the Guild, to practice his Art. Each three years thereafter he is reexamined and his license renewed if he passes the qualifications. You are aware of this?"

Lord Darcy nodded. "Yes, Your Grace."

"Very well," said the Archbishop, "but what would disqualify a sorcerer? What would prevent the Church from renewing his license? Well, there are many things, but chief among them would certainly be the practice of Black Magic. Unfortunately, except for a very few peculiarly qualified Sensitives it is not possible to detect when a man has practiced what is technically known as Black Magic if the spells are minor, if the harm they have done is relatively small, if the practitioner has not been too greatly corrupted by the practice. Do you follow?"

"I think so," said Lord Darcy.

"Then," continued the Archbishop, raising a finger, "you will see how it is that a man may get away with practicing Black Magic for some time before it has such an effect upon his psyche that it becomes obvious to a Board of Examiners that he can no longer be certified as practicing orthodox sorcery.

"Now, a major crime, such as murder, would, of course, instantly be detectable to a certifying commission assembled for the purpose. The sorcerer in question would be required to undergo certain tests which he would automatically fail if he had used his Art to commit so heinous a crime as murder."

He turned a hand palm upward. "But you can see that it would be impossible to give every sorcerer here such a test. The Guild must assume that a member is orthodox unless there is sufficient evidence to warrant testing his orthodoxy."

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"I quite understand that," said Lord Darcy, "but I also know that you are one of the most delicate Sensitives and one of the most powerful Healers in Christendom." He looked directly into the Archbishop's eyes. "I know Lord Seiger of Yorkshire."

His Grace's eyes showed sadness. "Ah, yes, poor Seiger. A troubled soul. I did for him what I could, and yet I knew . . . yes, I knew . . . that in spite of everything he would not live long."

"Your Grace recognized him as a psychopathic killer," said Lord Darcy. "If we have such a killer in our midst now, would he not be as easily recognizable as was Lord Seiger?"

The Archbishop's troubled eyes looked first at Lord Darcy and then at Lord Ashley. "My lords," he said carefully, "the realm of magic is not that easily divisible into stark white and deadly black, nor can human souls be so easily judged. Lord Seiger was an extreme case, and, therefore, easily perceived and easily isolated, even though he was difficult to treat. But one cannot say 'this man is capable of killing,' and 'this man has killed,' and for that reason alone isolate him from society. For these traits are not necessarily evil. The ability to kill is a necessary survival characteristic of the human animal. To do away with it by fiat would be in essence to destroy our humanity. For instance, as a Sensitive I can detect that both of you are capable of killing; further, that both of you have killed other human beings. But that does not tell me whether or not these killings were justified. We Sensitives are not angels, my lords. We do not presume to the powers of God Himself. Only when there is true, deep-seated evil intent does it become so blatantly obvious that it is instantly detectable. I find, for instance, no such evil in either of you."

There was a long moment of silence and finally Lord Darcy said, "I believe I understand. Am I correct, however, in saying that, if every sorcerer here were to be given the standard tests for orthodoxy, anyone who had committed a murder by Black Magic would be detectable through these tests?"

"Oh, indeed," said the Archbishop, "indeed. Rest assured that if the secular arm cannot discover the culprit these tests *will* be given. But" —he emphasized his point with a long, thin finger—"as yet neither the Church nor the Guild has any evidence whatever that such black sorcery has been practiced. That is why we hold off."

"I see," said Lord Darcy. "One other thing, with Your Grace's permission. What do you know of a Demoiselle Tia Einzig?"

"Demoiselle Tia?" the saintly old man chuckled. "Ah, there is one, my lord, whom you may dismiss immediately from your mind if you suspect her of any complicity in this

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affair. In the past few months she has been examined twice by competent Boards and Examiners. She has never in her life practiced Black Magic."

"I disagree with you that that alone absolves her of complicity," said Lord Darcy. "A person could certainly be involved in a murder without having been the actual practitioner of Black Magic. Correct me if I am wrong."

The Archbishop looked thoughtful. "Well, you are right, of course. It would be possible . . . yes, yes, it *would* be possible . . . for Mistress Tia to have committed a crime, so long as it was not the crime of Black Magic we would not necessarily have detected it." He smiled. "I assure you there is no harm in her, no harm at all."

His attention was distracted by someone who was approaching the table. Lord Darcy looked up. Mary of Cumberland was excited, but she was doing her best to keep from showing it.

"Your Grace," she said. She curtsied quickly, and then looked at Lord Darcy. "I"—she stopped and glanced at Lord Ashley and then at the Archbishop before looking back at Lord Darcy—"Is it all right to talk, my lord?"

"About your assignment?" Lord Darcy asked.

"Yes."

"We have just been discussing Tia. What new intelligence do you have for us?"

"Pray be seated, Your Grace," said the Archbishop. "I should like to hear anything you have to say about Tia."

In a low voice the Dowager Duchess of Cumberland told of her conversation with Tia Einzig, of Tia's short meeting with the man in the bar, and of the incident concerning the note in Tia's room, with an attention to detail and accuracy that not even Lord Bontriomphe could have surpassed.

"I have been looking all over for you," she finished up. "I went to the office; the Sergeant-at-Arms said he hadn't seen you. It was just lucky that I walked in here."

Lord Darcy held out his hand. "Let me see that piece of paper," he snapped. She handed it to him.

"That's why I was in such a hurry to find you. All I can read on it are the numbers."

"It is in Polish," said Lord Darcy. " 'Be at the *Dog and Hare* at seven o'clock,' " he translated. "There is no signature."

He glanced at his watch. "Three minutes of seven! Where the Devil is the *Dog and Hare?*"

"Could that be *'Hound and Hare'?"* said Lord Ashley. "That's a pub on Upper Swandham Lane. We can just make it."

"You know of no *'Dog and Hare'?* No? Then we'll have to take a chance," Lord Darcy said. He turned to the Dowager Duchess. "Mary, you've done a magnificent job. I haven't time to thank you fur-

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ther just now. I must leave you in the company of the Archbishop. Your Graces must excuse us. Come on, Ashley. Where is this *Hound and Hare?"*

They walked out of the Buckler Room into the lobby of the hotel. Lord Ashley gestured. "There's a corridor that runs off the lobby here and opens into Potsmoke Alley. A turn to our right puts us on Upper Swandham Lane. No more than a minute and a half."

The two men pulled their cloaks about them and put up their hoods to guard against the chill of the fog outside. Ignoring the looks of several sorcerers who wondered why two men were charging across the lobby at high speed, they went down the corridor to the rear door. A Man-at-Arms was standing by the door.

"I'm Lord Darcy," snapped the investigator. "Tell Lord Bontriomphe that we are going to the *Hound and Hare;* that we shall return as soon as possible."

XV

In Potsmoke Alley the fog closed about the two men, and when the rear door to the Royal Steward was closed behind them they were surrounded by darkness.

"This way," said Ashley. They turned right, feeling their way down Potsmoke Alley to the end of the block of buildings to where St. Swithin's Street crossed the narrow alley and widened it to become Upper Swandham Lane. Here there were a few gas lanterns glowing dimly in the fog, but even so it was difficult to see more than a few feet ahead.

As he and Ashley emerged from Potsmoke Alley, Lord Darcy could hear a distant *click! . . . click! . . . click! . . .* approaching through the fog to their right, on St. Swithin's Street. It sounded like someone wearing shoes with steel taps. To the left he could hear two pairs of leather-shod boots retreating, one fairly close by, the other farther down the street. Somewhere ahead, far down Upper Swandham Lane, he could hear a coach and pair clattering slowly across the cobblestones.

The two men crossed St. Swithin's Street and went down Upper Swandham Lane. "I think that's it ahead," said Lord Ashley, after a minute. "Yes. Yes, that's it."

The sign underneath the gas lantern depicted a bright blue gazehound in hot pursuit of an equally blue hare.

"All right, let's go in," said Lord Darcy. "Keep your hood up and your cloak closed. I shouldn't want anyone to see that Naval uniform. This way, we might be ordinary middle-class merchants."

"Right," said Lord Ashley, "I hope we can spot the girl. Do you know her when you see her?"

"I think so. Her Grace's description was quite detailed; there can't

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be many girls of her size and appearance wandering about London." He pushed open the door.

There was a long bar stretching along the full length of the wall to Darcy's left. Along the wall to his right was a series of booths that also stretched to the back of the room. In the rear there were several tables in the center of the floor, between the bar and the booths. Some men at one were playing cards, and a dart board on the back wall was responding with the *thunk! . . . thunk! . . . thunk! . . .* of darts thrown by a patron whose arm was as strong as his aim was weak.

Darcy and Ashley moved quickly to an empty spot at the bar. In spite of the number of customers the big room was not crowded.

"See anybody we know?" murmured Lord Ashley.

"Not from here," Lord Darcy said. "She could be in one of those rear booths. Or possibly she hasn't arrived yet."

"I think your second guess was correct," Ashley said. "Take a look in the mirror behind the bar."

The mirror reflected the front door perfectly, and Lord Darcy easily recognized the tiny figure and beautiful face of Tia Einzig. As she walked across the room toward the back the identification was complete in Darcy's mind. "That's the girl," he said. "Notice the high heels that Her Grace mentioned."

And, he realized, those heels also explained those clicking footsteps he had heard on St. Swithin's Street. She hadn't been more than thirty seconds behind Ashley and himself.

Tia did not look around. She walked straight toward the rear as if she knew exactly where the person she was to meet would be waiting. She went directly to the last booth, near the back door of the pub, and slid in on the far side, facing the front door.

"I wonder," said Lord Darcy, "is there somebody already in that booth? Or is she waiting for the person who sent her the note?"

"Let's just stroll back and see," said Lord Ashley.

"Good, but don't get too close. I don't want either of them to see our faces."

"We could watch the dart game," said Lord Ashley, "that might be interesting."

"Yes, let's," said Lord Darcy. They walked slowly back to the far end of the bar.

There was someone in the booth, seated directly across from Tia Einzig. It was obviously a man, but the hood of the cloak completely concealed his face, and he kept his head bent low over the table.

Lord Darcy said: "Let's move over to that table. I want to see if I can hear their conversation. But move carefully. Keep your face concealed without being obvious about it."

The nearest table was further to-

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ward the front of the room than the booth that the two men were watching. They could no longer see the hooded man at all. His back was to them now and he kept his voice low, so that, while it was audible, it was not intelligible. Tia, however, was facing them, and, as Mary de Cumberland had told Lord Darcy the previous evening, the girl's voice had abnormal carrying power, even when she did not speak loudly.

For several seconds all they could hear was the low mutter of the man's voice, then Tia said, "If you didn't want him dead, why did you kill him?" Her expression was hard and cold, with an undertone of anger.

More muttering, then Tia again: "You discovered that Zed, the much-feared head of Imperial Naval Intelligence in Europe, was actually Master Sir James Zwinge, and you mean to sit there and tell me that King Casimir's Secret Service didn't want him dead?"

A couple of angry words from the hooded man.

"I'll talk any way I please," said Tia. "*You* keep a civil tongue in *your* head."

She said nothing more for nearly a minute, as she listened to the hooded man with that unchanging stony expression of cold anger on her beautiful face. Then an icy smile came across her lips.

"No, I will not," she said. "I won't ask him. Not for you, not for Poland, not for King Casimir's whole damned army!"

A short phrase from the hooded man. Tia's cold smile widened just a trifle. "No, damn you, not for *him* either. And do you know why? Because I know *now* that you *lied* to me! Because I know *now* that he's safe from the torture chambers of the Polish Secret Service!"

The hooded man said something more. "Signing his death warrant?" She laughed sharply, without humor. "Oh no. You've harassed me long enough. You've tried to force me to betray a country that has been good to me, and a man who loves me. I've lived in constant fear and terror because of you, but no longer. Oh, I'm going to sign a death warrant all right—yours! I'm going to blow this whole plot sky high. I'm going to tell the Imperial authorities everything I know, and I hope they hang you, you vicious, miserable little . . ."

She stopped suddenly and blinked. "What?" She blinked again.

Lord Darcy, watching Tia's face covertly from beneath his hood, saw her expression change. Where before it had been stony, now it became wooden. The cold expression became no expression at all.

The Commander suddenly reached over and grabbed Darcy's wrist.

"Watch it!" he whispered harshly. "They're going to leave by the back door!"

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Lord Darcy smiled inwardly. Lord Bontriomphe had mentioned that Ashley had occasional flashes of precognition, and here was an example of it. Such flashes came to an untrained Talent in moments of personal stress.

As Ashley had predicted, Tia rose to her feet, as did the hooded man, his back still toward the watchers. The hooded man did not turn. Tia did, and the two of them walked directly out the back door, only a few feet away.

Darcy and the Commander were on their feet, heading toward the back door. Then Lord Darcy stopped, his hand on the doorknob.

"What are you waiting for?" Ashley asked.

"I want them to get far enough ahead so that they won't notice the light when I open this door."

"But we'll lose them in this fog!"

"Not with those high heels of hers. You can hear them ten yards away."

He eased the door open a trifle. "Hear that? They're moving away toward our right. What street is this?"

"That would be Old Barnegat Road," said Lord Ashley.

"All right, let's go." Lord Darcy swung open the door and the two men stepped out into the billowing fog. The steady clicking of Tia's heels was still clearly audible.

"Let's close up the distance," Lord Darcy said as they walked steadily through the shrouded darkness. "If we walk quietly, they won't notice our footsteps over the sound of hers."

The two men said nothing for several minutes as they followed the beacon of sound that came from Tia's heels. Then, in a low voice, Lord Ashley said, "You know, I didn't understand much of that conversation back at the pub—but I guess I should be thankful I could understand any of it at all."

"Why?" asked Lord Darcy.

"I had rather assumed it would be in Polish. We know the Einzig girl speaks Polish and the note indicates that the man does, too."

"Quite the contrary," said Lord Darcy. "The note indicates that the man has a slight acquaintance with the Polish tongue, but hardly enough to carry on a lengthy conversation in it. The Poles differentiate between a 'hound' and a 'dog' just as we do. Yet in translating *'Hound and Hare'* into Polish, he used the Polish word for 'dog,' which no one who was conversant with the language would have done. And that tells us a great deal more about the man we are following."

"In what way, my lord?"

"That he is vain, pretentious, and has an overdeveloped sense of the melodramatic. He could quite as easily have written the note in Anglo-French, yet he did not. Why?"

"Perhaps because he felt that it would not be understood by anyone else who happened to see it."

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"Precisely; and you have fallen into the same error he did. Only a man who is unfamiliar with a language thinks of it as a kind of secret writing. Do you think of Anglo-French as a cryptic language with which to conceal your thoughts from others?"

"Hardly," said Lord Ashley with a smile.

"But even so," Lord Darcy said softly, "only a vain, pretentious man would attempt to show off his patently poor knowledge of a language to a person whose native tongue it is."

At a corner ahead of them, the sound of Tia's heels turned again to the right. "Where are we now?" Lord Darcy asked.

"If I haven't lost my bearings, we just passed Great Harlow House; that means they turned on Thames Street, heading roughly south."

Lord Darcy wished, not for the first time, that he knew more about the geography of London. "Have you any idea where they're going?" he asked.

"Well, if we keep on this way," said Lord Ashley, "we'll pass St. Martin's Church and end up smack in the middle of Westminster Palace."

"Don't tell me they're going to see the King," said Lord Darcy. "I really don't believe I could swallow that."

"Wait, they're turning left."

"Where would that be?"

"Somerset Bridge," Lord Ashley said. "They're crossing the river. We'd better drop back a little. There are lights on the bridge."

"I think not," said Lord Darcy. "We'll take our chances."

"How much longer are they going to keep walking?" Lord Ashley muttered. "Are they out on a pleasant evening stroll to Croydon or something?"

The lights on the bridge did not hamper them in any way. They were widely spaced, and the fog was so dense, especially here over the Thames, that someone standing directly under a gas lamp could not be seen from fifteen feet away. They kept walking at a steady pace.

Suddenly the clicking stopped, somewhere near the middle of the bridge. Automatically the two men also stopped. Then they heard a single sentence, muffled but clearly intelligible: "Now climb up on the balustrade."

"Good God!" said Darcy. "Let's go!"

The two men broke into a run. Caution now was out of the question. The hooded man came suddenly into sight, through the veil of fog. He was standing near one of the gas lamps. Tia Einzig was nowhere to be seen. From the river below came the sound of a muffled splash.

At the sound of footsteps the hooded man turned, his face still hidden, shadowed from the overhead light by the hood of his cloak. He froze for a second as if deciding

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whether or not to run. Then he realized it was too late, that his pursuers were too close for him to escape. His right hand dived beneath his cloak and came out again with a smallsword. Its needlelike blade gleamed in the foggy light.

The Imperial Navy's training was such that Commander Lord Ashley's reaction was almost instinctive. His own narrow-bladed rapier came from its scabbard and into position before the hooded man could attack.

"Take care of him!" Lord Darcy shouted. "I'll get the girl!" He was already racing across the bridge to the downstream side, opening his cloak and dropping it behind him as he ran. He vaulted to the top of the broad stone balustrade, stood for a moment, then took a long clean dive into the impenetrable blackness below.

XVI

Commander Lord Ashley did not see Lord Darcy's dive from the bridge. His eyes had not for a second left the hooded figure that faced him in the tiny area of mist-filled light beneath the gas lamp. He felt confident, sure of himself. The way the other man had drawn his sword proclaimed him an amateur.

Then, as his opponent came in suddenly, he felt an odd surge of fear. The sword in the other man's hand seemed to flicker and vanish as it moved!

It was only by instinct and pure luck that he managed to avoid the point of the other's sword and parry the thrust with his own blade. And still his eyes could not find that slim, deadly shaft of steel. It was as if his eyes refused to focus on it, refused to look directly at it.

The next few seconds brought him close to panic as thrust after thrust narrowly missed their mark, and his own thrusts were parried easily by a blade he could not see, a blade he could not find.

Wherever he looked, it was always somewhere else, moving in hard and fast, with strikes that would have been deadly, had his own sword not somehow managed to ward them off each time. His own thrusts were parried again and again, for each time the other blade neared his own, his eyes would uncontrollably look away.

He did not need to be told that this was sorcery. It was all too apparent that he was faced with an enchanted blade in the hands of a deadly killer.

And then the Commander's own latent, untrained Talent came to the fore. It was a Talent that was rare even in the Sorcerers Guild. It was an ability to see a very short time into the future, usually only for seconds, and—very rarely—for whole minutes.

The Guild could train most men with that Talent; these were the sorcerers who predicted the weather, warned of earthquakes, and

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foresaw other natural phenomena that were not subject to the actions of men. But, as yet, not even the greatest thaumaturgical scientists had devised a method of training the Commander's peculiar ability. For that ability was the rarest of all —the ability to predict the results of the actions of men. And since the thaumaturgical laws of time symmetry had not yet been fathomed, that kind of Talent still could not be brought to the peak of reliability that others had been.

The Commander had occasional flashes of precognition, but he never knew when they would come nor how long he could sustain their flow. But, like any other intelligent man who has what he knows is an accurate hunch, Commander Lord Ashley was capable of acting upon it.

Quite suddenly, he realized that he had known instinctively, with each thrust, where that ensorcelled blade was going to be. The black sorcerer who sought to kill him might have trained Talent on his side, but he could not possibly cope with Commander Lord Ashley's hunches.

Once he realized that, Ashley's eyes no longer sought the enemy's blade, or the arm that held it. They watched the body of his opponent. It moved from one position to another as though posing for sketches in a beginner's textbook. But he could have kept his eyes closed and still known.

For a little while, Ashley did nothing but ward off the other's attacks, getting the feel of the black sorcerer's sword work. But he was no longer retreating.

He began to move in. Step by step he forced his opponent back. Now they were directly beneath the gas lamp again. Lord Ashley could tell that the other man was beginning to lose his confidence. His thrusts and parries were less certain. Now the panic and fear were all on the other side.

With careful deliberation, Commander Lord Ashley plotted out his own course of action. He did not want this man dead; this sorcerer and spy must be arrested, tried, and hanged, either for the actual murder of Sir James Zwinge, or for having ordered it done. There was no doubt in Lord Ashley's mind as to the guilt of this black sorcerer, but it would be folly to kill him, to take the King's Justice into his own hands.

He knew, now, that it would be easy to take his opponent alive. It would require only two quick moves: a thrust between elbow and wrist to disarm the man, and then a quick blow to the side of his head with the flat of the blade to knock him senseless.

Lord Ashley made two more feints to move his opponent back and get him in just the right position to receive the final thrust. The sorcerer retreated as though he were

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obeying orders—which, indeed, he was: the orders of the lightning-swift rapier in the Commander's hand.

Now the gas lamp was at Ashley's back, and for the first time the light fell full upon the face beneath the hood.

Lord Ashley smiled grimly as he recognized those features. Taking *this* man in would be a pleasure indeed!

Then the moment came. Ashley began his lunge toward the sorcerer's momentarily unprotected forearm.

It was at that moment that he felt his Talent desert him. He had become overconfident, and the psychic tension, which had sustained his steady flow of accurate hunches, had fallen below the critical threshold.

His left foot slipped on the fog-damp pavement of the bridge.

He tried to regain his balance but it was too late. In that moment, he could almost feel death.

But he had already thrown the fear of death so deeply into his opponent that the sorcerer did not see the opening as a chance to kill. He only saw that, for a moment, the deadly Naval sword no longer threatened him. His cloak swirled around him as he turned and ran, vanishing into the surrounding fog as though he had never been.

Lord Ashley kept himself from falling flat on his face by catching his weight on his outstretched left arm. Then he was back on his feet, and a stab of pain went through his right ankle. He could hear the running steps of the sorcerer fading into the distance, but he knew he could never catch him trying to run on a twisted ankle.

He braced himself against the balustrade for a moment and gave in to the laughter that had been welling up ever since he had seen that twisted, frightened face. The laughter was at himself, basically. To think that, for a few seconds, he had actually been deathly afraid of that obsequious little worm, Master Ewen MacAlister!

It took half a minute or so for the laughter to subside. Then he pulled a deep breath of fog-laden air into his lungs, and wiped the perspiration from his forehead with the back of his left hand. Deftly, he slid his sword back into its sheath.

It was too bad, he thought, that a spot of slippery pavement had prevented him from capturing Master Ewen, but at least the identity of the black sorcerer was now known, and Lord Darcy could—

Lord Darcy!

The haze of excitement cleared from his brain, and he limped across the bridge to the balustrade on the downstream side.

Black as pitch down there. He could see nothing.

"Darcy!" the Commander's voice rang out across the water, but the dense fog that brooded over the riv-

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er seemed to distort and disperse the sound before it traveled far. There was no answer.

Twice more he called, and still there was no answer.

He heard rapid footsteps coming from his right and turned to face them, his hand on the hilt of his narrow-bladed sword.

MacAlister returning? It couldn't be! And yet . . .

Damn the fog! He felt as though he were isolated in a little world of his own, whose boundaries were a bank of cotton wool a dozen feet away, and which was surrounded by invisible beings that were nothing but disembodied footsteps.

Then he saw a glow of light, and out of the cotton wool came a friendly figure, carrying a pressure-gas lantern. Lord Ashley didn't know the big, heavy man, but the black uniform of a London Armsman made him a friend. The Armsman slowed, stopped, and put his hand on the hilt of his own small-sword. "May I ask what's going on here, sir?" he inquired politely. But his eyes were wary.

Lord Ashley carefully took his hand off the hilt of his own sword. The Armsman kept his where it was. "I heard a disturbance on the bridge, sir," he said stolidly. "A noise of swords clashing, it sounded like, sir. Then somebody from off the bridge ran past me in the fog. And just now . . ." He paused. "Were that you shouting, sir?"

It came suddenly to Lord Ashley what a forbidding figure he must be. In his long black Naval cloak, with the hood up, and his back to the lamp, his shadowed face was as invisible as MacAlister's had been. He reached up with one hand and pulled back the hood, and then pushed the cloak back over his shoulders so that the Armsman could see his uniform.

"I am Commander Lord Ashley," he said. "Yes, Armsman, there has been trouble. The man you heard running is a criminal wanted for murder."

"Murder, your lordship?" said the Armsman blankly. "Who was he?"

"I'm afraid he did not give me his name," said Lord Ashley. The statement was perfectly true, he thought, and he wanted to tell Darcy about MacAlister before he told anyone else. "The point is that a short time ago he pushed a young girl off the bridge. My companion dived in after her."

"Dived in after her? That were a foolish thing to do on a night like this. Likely we've lost two people instead of one, your lordship."

"That may well be," Lord Ashley admitted. "I've called him and he doesn't answer. But he's a powerful man, and although the chances are against his having found the girl, there's a good chance he can make it to shore by himself."

"All right, your lordship, we'll start looking for both of them right away." He took out his whistle and blew a series of shrill, high, keen-

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ing notes into the murk-filled air—the "Assistance" call of the King's Armsmen. A second or two later, they heard distant whistles from both sides of the river blowing the answer: "Coming." After several more seconds, the Armsman repeated the call, to give his hearers a bearing.

"There'll be help along in a few minutes. Nothing we can do till then," the Armsman said briskly. He took a notebook from his jacket pocket. "Now, your lordship, if I might have your name again and the names of the other people involved."

The Commander repeated his own name, then he said, "The girl's name is Tia Einzig." He spelled it. "She is an important witness in a murder case, which is why the killer tried to do away with her. The man who went in after her is Lord Darcy, the—"

"Lord Darcy, did you say?" The Armsman lifted his head suddenly from the notebook. "Lord Darcy, the famous investigator from Rouen?"

"That's right," said Lord Ashley.

"The same Lord Darcy," persisted the Armsman, who seemed to want to make absolutely sure of the identification, "who came over from Normandy to help Lord Bontriomphe solve the Royal Steward Hotel Murder?"

"The same," Lord Ashley said wearily.

"And he's gone and jumped in the *river?*"

"Yes, that's what I said. He jumped in the river. He was trying to save this girl. By now he's had time to swim clear to the Nore. If we wait a little longer, he may be on his way back."

The Armsman looked miffed. "No need to get impatient, your lordship. We'll get things done as fast as we can." He put his whistle to his lips again and sent out the distress call a third time. Then, after a moment, a fourth.

Then they could hear hoofbeats clattering on the distant street and the sound changed to a hollow thunder as the horse galloped onto the bridge. They could see a glow of light approaching through the fog; the Armsman signaled with his own lantern. "Here comes the sergeant now, your lordship."

The mounted Sergeant-at-Arms was suddenly upon them, pulling his big bay gelding to a halt, as the Armsman came to attention. "What seems to be the trouble, Armsman Arthur?"

"This gentleman here, Sergeant, is Commander Lord Ashley of the Imperial Navy." Referring to his notebook, he went on to report quickly and concisely what Lord Ashley had told him. By that time, they could hear the thud of heavy boots and the clatter of hoofbeats from both ends of the bridge, as more Armsmen approached.

"All right, My Lord Commander," said the sergeant, "we'll take care of it. Likely he swam for

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the right bank since it's the nearer, but we'll cover both sides. Arthur, you go to the Thames Street River Patrol Station. Tell them to get their boats out, and to send a message to the other patrol stations downriver. We'll want everything covered from here to Chelsea."

"Right away, Sergeant." Armsman Arthur disappeared into the fog.

"I'd like to ask a favor if I may, Sergeant," said Lord Ashley.

"What might that be, My Lord Commander?"

"Send a horseman to the Royal Steward Hotel, if you would. Have him report exactly what happened to the Sergeant-at-Arms on duty there. Also, there is an official Admiralty coach waiting for me there, Petty Officer Hosquins in charge. Have your man tell Hosquins that Commander Lord Ashley wants him to bring the coach to Thames Street and Somerset Bridge immediately. I'm going to assume that Lord Darcy made for the right bank, and help your men search that side."

"Very good, My Lord Commander. I'll send a man right along."

Mary de Cumberland walked across the almost deserted lobby of the Royal Steward, doing her best to suppress her nervous impatience.

She felt she ought to be doing something, but what?

She would like to have talked to someone but there was no one to talk to.

Sir Lyon and Sir Thomas were still in conclave with the highest ranking sorcerers of the Empire. Master Sean was at the morgue attending to the autopsy of Sir James Zwinge. Lord Bontriomphe, according to the Sergeant-at-Arms who was on duty in the temporary office, was out prowling the city in search of a missing man named Paul Nichols. (She knew that the Sergeant-at-Arms would not have given her even that much information except that Lord Bontriomphe had told him that Her Grace of Cumberland would be bringing in information. The sergeant apparently assumed that her status in the investigation was a great deal more official than it actually was.)

And Lord Darcy was in a low dive down the street, keeping an eye on Tia.

Which left the Duchess with nothing to do.

Part way across the lobby, she turned and headed down the hall that led back to the temporary office. Maybe some information had come in. Even if none had, it was better to be talking to the sergeant than to be pointlessly pacing the hotel lobby.

If this had been a normal convention, she could have found plenty of convivial companionship in the Sword Room, but the murder had stilled the thirst of every sorcerer in the hotel. She went through the open door of the little office. "Anything new, Sergeant Peter?"

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"Not a thing, Your Grace," said the sergeant-at-arms, rising to his feet. "Lord Bontriomphe's not back yet and neither is Lord Darcy."

"You look as though you're as bored as I am, Sergeant. Do you mind if I sit down?"

"It would be an honor, Your Grace. Here, take this chair. Not too comfortable, I'm afraid. They didn't exactly give their night manager their best furniture."

They were interrupted by another sergeant-at-arms who walked in the door. He gave the Duchess a quick nod, said, "Evening, mum," and then addressed Sergeant Peter. "Are you in charge here, Sergeant?"

"Until Lord Bontriomphe or Lord Darcy gets back, I am. Sergeant Peter O Sechnaill."

"Sergeant Michael Coeur-Terre, River Detail. Lord Darcy might not *be* back. Girl named Tia Einzig got pushed off Somerset Bridge, and Lord Darcy jumped off the bridge after her. They're putting out patrol boats and search parties on both sides of the river from Somerset Bridge to Chelsea, but personally I don't think there's much chance. A Commander Lord Ashley asked us to report to you. He said Lord Bontriomphe would want the information."

Sergeant Peter nodded. "Right," he said briskly. "I'll tell his lordship as soon as he comes in. Anything else?"

"Yes. Do you know where an Admiralty coach is parked around here with a Petty Officer Hosquins in charge of it? Commander Lord Ashley says he wants it at Thames Street and Somerset Bridge immediately. He wants transportation for Lord Darcy when they find him, though it's my opinion that his lordship is done for."

Mary de Cumberland had already risen to her feet. Now she said, in a very quiet voice, "He is not dead. I should know it if he were dead."

"I beg your pardon, mum?" said Sergeant Michael.

"Nothing, Sergeant," she said calmly. "At Thames Street and Somerset Bridge, you said? I know where the Admiralty coach is. I shall tell Petty Officer Hosquins."

Sergeant Michael noticed, for the first time, the Cumberland arms on Mary's dress. Simultaneously, Sergeant Peter said, "Her Grace is working with us on this case."

"That's . . . that's very good of Your Grace, I'm sure," said Sergeant Michael.

"Not at all, Sergeant." She swept out of the room, walked rapidly down the hall, across the lobby, and out the front door of the Royal Steward. She hadn't the dimmest notion of where the Admiralty coach might be parked, but this was no time to quibble over details.

It didn't take her long to find it. It was waiting half a block away, toward St. Swithin's Street. There was no mistaking the Admiralty arms emblazoned on its door. The

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coachman and the footman were sitting up in the driver's seat, their greatcoats wrapped around them and a blanket over their legs, quietly smoking their pipes and talking.

"Petty Officer Hosquins?" Mary said authoritatively. "I'm the Duchess of Cumberland. Lord Ashley has sent word that the coach is wanted immediately at Thames Street and Somerset Bridge. I'm going with you." Before the footman had even had a chance to climb down she had opened the door and was inside the coach. Petty Officer Hosquins opened the trap door in the roof and looked down at her.

"But Your Grace," he began.

"Lord Ashley," the Duchess cut in coldly, "said *'immediately.'* This is an emergency. Now, dammit, get a move on, man."

Petty Officer Hosquins blinked. "Yes, Your Grace," he said. He closed the trap. The coach moved on.

TO BE CONCLUDED

IN TIMES TO COME

Murray Leinster—who did the lead story in Vol. 1, No. 1 issue of Astounding Stories of Super Science back in 1930—is back again in the November 1966 issue with a new Med Service story, "Quarantine World".

Now normally, you'd think that a world with severe medical problems would be most happy to have a Med Service doctor drop in. But this time Calhoun and his invaluable medical assistant, Murgatroyd—who was very inhuman, and, therefore, incomparably helpful usually—ran up against the weirdo situation of a planet so diseased it didn't know it was, and another that knew it was, and didn't want Med Service to cure it!

And both most fanatically uncooperative with Med Service's Dr. Calhoun!

The Editor

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the reference library

P. Schuyler Miller

ROOTS

Although I have commented ponderously from time to time on the extent to which science-fiction themes and techniques are or are not being used in mainstream fiction, or vice versa, the fact is that sensible students of literature have never looked on it as anything but an integral part of the whole. To an extent that has been completely missed by laymen—though probably not by such writers as James Blish and Damon Knight—the academic world has been studying the stuff for years.

For a glimpse of how extensive this scholarly literature on science fiction actually is, may I recommend you to the footnotes of a book by Professor H. Bruce Franklin of Stanford University, "Future Perfect," published early this year by Oxford University Press (402+xiii pages; $6.50). For another glimpse of the part science fiction played in the literature of the last century, read the analytical sections of his book. And for samples of this century-old science fiction, read the rest of the book.

Sam Moskowitz has, of course, made clear in his "Explorers of the Infinite" that science fiction in America did not arise full-grown out of the first issue of *Amazing Stories*. Books like J. O. Bailey's "Pilgrims Through Space and Time" (1947) have itemized titles and plots in great detail. Nevertheless, Professor Franklin's book stands in a class by itself. Bailey was a cataloguer, and so to a degree is Moskowitz. Franklin's profession is the dissection of literature, and he very evidently reads and understands present-day science fiction as Bailey did not. You may find this form of literary analysis unconvincing and even painful, but you can't complain that it is superficial, as is most of the discussion of current science fiction by members of the literary "Establishment."

The fiction itself is, of course, the product of its day. If Poe and Hawthorne had written in the idiom of Hemingway, they would never have been published, much less read, preserved and studied. Of the stories and selections reprinted in "Future Perfect," you may not find much readable by our tenets until you reach S. Weir Mitchell's "Was He Dead?" of 1870, and even Stanley Waterloo and Mark Twain are not too "modern" after that.

But you will find—and this is the point that Professor Franklin

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stresses over and over—that the science fiction of the 1800s was as much a medium of speculation about Man's relation to the world and the universe, and about his own nature, as it is in our own time. Such speculation could be more straightforward and less sugar-coated in those days than it is now, when the serious aspect must usually be subordinated to the entertainment value. ". . . A picture, an image, or a shadow (is always) so much more attractive than the original," says Aylmer in Hawthorne's "The Birthmark," and it is.

Will one of the university presses, or one of the more ambitious fan publishers like Advent, undertake an anthology of these serious scholarly discussions of science fiction? It should include the English and European essays of our own time. Until someone does, only readers with a good university library at hand are likely to be able to explore the structure whose door Professor Franklin has opened.

MINDSWAP

By Robert Sheckley • Delacorte Press, New York • 1966 • 216 pp. • $3.95

Robert Sheckley has never been exactly stereotyped in his approach to science fiction and fantasy themes, but this book can only be called surrealistic . . . dadaistic . . . science-fiction-of-the-absurd . . . but by no means camp.

Marvin Flynn, a drab enough unhero from upstate New York, decides that the only way he can get out of his rut is by swapping bodies with Ze Kraggash, a Martian. Unfortunately, Ze Kraggash has negotiated contracts with eleven other entities from all over the universe, and Marvin isn't the first. No sooner is he in residence than he is given six hours to vacate, and in the meantime Kraggash has skipped in his human body for worlds unknown.

Marvin's only way out is to start a chain of body-hopping until his own *corpus* is tracked down, hopefully in good condition. He sets a rather peculiar Martian detective on the trail, then puts his mind on the road.

In his first incarnation—or embodiment, to be more precise—Marvin finds himself an Ootheca Indagator, Second Class, hunting ganzer eggs on Melde II. His difficulties only begin when he has netted his first egg; it is not only devilishly persuasive in conversation but persuasively devilish in getting out of nets. The subsequent revelations of the shoestring-based Meldan economy are suitably outrageous. Finally the resourceful egg produces a hermit who shuttles Marvin's reeling mind to Celsus V, which might have been called the potlatch planet if the compulsory gifts weren't apt to be booby-trapped. Suspecting the worst, one Marduk Kras has arranged to have his body occupied by someone else

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at the moment when his ticking snout-ring blows his ugly head off. The someone is, of course, Marvin.

To my taste, and apparently to Marvin's, events get a little too far out at this stage. He takes psychological refuge in metaphoric deformation, otherwise known as "Panzaism," in which his assaulted and somewhat bruised mind converts the unfamiliar surroundings of Celsus into the familiar stereotypes of the formula Western. This gives the author the opportunity to mangle those conventions even more thoroughly than he has those of science fiction, then to do the same with the sword-and-dagger romance of Sabatini vintage, and finally to run hog-wild among the images.

Strictly for I dunno who.

TWENTY THOUSAND LEAGUES UNDER THE SEA

By Jules Verne • Washington Square Press, New York • 1965 • 387 pp. • $3.95 • Washington Square Readers Enrichment Series No. RE709 • 1966 • 95¢

When English and American publishers, a century ago, learned of the immense popularity of Jules Verne's novels, they were quick to have them translated into English. How bad these old translations were, most of us have never suspected, since few fans have read the original French. Now Professor Walter James Miller of New York University has given us an all-new edition available in both a handsome, illustrated hardback edition and a paperback designed for school use.

From Professor Miller's introduction, it is evident that the "Readers Enrichment" paperback was his original project; the hardback is the bonus. He describes some of the shortcomings of earlier versions, even in the French—badly translated, badly edited, badly proofread. Technical language—one of Verne's strong points—was garbled by academic translators, as it all too often is today when a foreign book is Englished. This edition has been freshly done from photostats of the first French edition.

Even if you don't want the hardback edition, the paperback is worth reading for the introduction. You also get a brief appreciation of Verne by Damon Knight, and in the paperback a 38-page "Readers Supplement" for school use, raising questions about the book for class discussion and, I suppose, homework.

Some publisher should put Professor Miller to work on the best of Verne's other books.

THE ANYTHING BOX

By Zenna Henderson • Doubleday & Co., Garden City, N. Y. • 1965 • 205 pp. • $3.95

Some of the stories in this collection should do more to bridge the gap between science fiction and accepted literature than anything that

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is published these days. Others are fairly formal science fiction or fantasy, though all are touched with the author's peculiar humanity. The title story and "Come On, Wagon" will be remembered long after her more conventional stories of "the People" are forgotten.

Like the children in Ray Bradbury's "The Veldt," the children of these stories share a world of terrors and magic and comforts that few adults can remember and almost none can share, unless they are like the one who momentarily feels Sue-lynn's invisible "Anything Box," or the other who remembers Miss Ebo in "Turn the Page." They can set Evil free, like Stevie in "Stevie and the Dark" or Dubby in "Hush!", or they can protect helpless adults from it like the children in "The Last Step." Their unprejudiced good will can show the solution to the insoluble, as in "The Subcommittee," or take the impossible in its stride, like the lost hills in "—And a Little Child."

As I have said, some of these stories are nearly conventional. The coven of "Things" are other-worldlings who cannot cope with human values. Padre Manuel in "Food to All Flesh" can save a dying visitor from the stars only by offering it his own self. The little girl in "Something Bright" is indeed involved with people of another continuum. Keeley, in "The Substitute," is strange and alienated because he is indeed a changeling. And the poignant young spirit trapped in the husk of "Aunt Daid" is kind to the Wandering Jew of legend. As for "The Grunder," that fabulous fish that swims through rock, is it allegory or hallucination?

Whatever the answer, this is one of the finest collections we have had in a long time. None of these stories would have been at home in Analog, except perhaps "Things," but they are an important part of what science fiction is today.

GIANTS UNLEASHED

Edited By Groff Conklin • Grosset & Dunlap, New York • 1965 • 248 pp. • $2.95

Time was, before paperbacks, when Grosset & Dunlap was *the* reprint house where all good books lived forever. Just once, that I can recall, they published an original science-fiction novel, Henry Kuttner's "Fury" (from Astounding) which is now a terrific rarity. Now they've done it again with an original anthology, most of which is also from the "great years" of Astounding Science Fiction and all of which dates between 1939—Robert Heinlein's "Misfit"—and 1958—Eric Frank Russell's "Basic Right."

G&D, I suspect, are gambling on the fact that today's SF magazines are published largely for the experienced reader. They think there are plenty of good old stories waiting for new readers who haven't seen them over and over in other

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anthologies, and that Groff Conklin is just the man to pick out a dozen to try on the dogs. And so he is. And they read just as well as they did the first time 'round.

What are they? Theodore Sturgeon's "Microcosmic God"—the man who learns to accelerate civilization. Richard Ashby's "Commencement Night," with its ruthless educational experiment gone a little wrong. Arthur C. Clarke's "The Deep Range"—the unforgettable short story that opens an unforgettable novel. J. T. McIntosh (remember him?) with "Machine Made," in its way a moving anticipation of Daniel Keyes' prize-winning "Flowers for Algernon." Edward Grendon's "Trip One," here in 1949, which struggled with the problem of infection by extra-terrestrial life forms that had killed the Martians in Wells' "War of the Worlds."

William Tenn changes the pace in "Venus Is a Man's World" by detailing the anguish of one young boy in a shipload of women bound for husbands on Venus. The humor continues in "Good-bye, Ilha!" by Lawrence Manning—now, there's one from history!—with its troubled alien trying to hate and understand men. And Isaac Asimov, in his almost forgotten "Misbegotten Missionary," gives us the puzzle-story of the diabolical alien that stows away on an Earthbound ship with motives totally unlike those of Ilha's friend.

Murray Leinster's "The Ethical Equations" is one of the most famous "first contact" stories—a monstrous warship drifting into the solar system with its monstrous crew asleep. Who should do what, and to whom? Heinlein's "Misfit," from 1939, gives us the mathematical genius who, in the kind of society Heinlein seems to prefer in his later books, would never be allowed to use his talent. Poul Anderson's "Genius" offers us a psychological experiment on a planet-wide scale, carried on by a galactic empire, that succeeds too well. And Eric Frank Russell, in "Basic Right," gives us another galactic conqueror handled by sociological judo.

If my guess as to the publisher's motive is right, I think they have a winner . . . and I hope they keep it up!

TUNNEL THROUGH TIME

By Lester del Rey • Westminster Press, Philadelphia • 1966 • 153 pp. • $3.50

The publisher considers this book part of its series of science-fiction yarns for ages twelve to fifteen, and I'd say he errs on the upper side. Any ten-year-old is curious enough about the world and open enough to new ideas so that he should sail through the yarn with ease.

Two teen-age boys go back through an intermittent time-tunnel to find out why the father of one

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of them hasn't returned. They have predictable adventures with predictable varieties of dinosaurs. They return in two jumps: one into the midst of one of the glacial maxima of the Pleistocene, and another into the U.S. of some twenty thousand years ago, when stereotyped savages nearly do them in. The saving grace in this episode, and in the book, is a friendly eight-year-old girl who helps them out. (I assume it's the publisher, not the author, who felt it necessary to have our bold lads improvise a skirt to keep the poor kid decent.)

The author, who has done far, far better, should have conferred with Bob Silverberg on this last episode. Twenty thousand years ago our heroes—if, as seems to be the case, they are in the northern United States—would have found themselves in another ice advance, and the savages they meet don't bear much resemblance to either the Clovis mammoth-hunters or the seed-and-root grubbing folk of the time. And that carnivorous flower is utter hokum! Since Lester del Rey could have made an even better story out of authentic stuff, maybe the publisher is to blame.

NOW & BEYOND

Belmont Books, New York • No. B50-646 • 157 pp • 50¢

No editor is credited with selecting the eight stories in this collection, and the names aren't in any of the indexes. They have evidently been changed, or originated in magazines that were not indexed in the post-Day (Donald) era. The authors' names are currently big, but the stories are relatively minor.

"The Turning Wheel," by Philip K. Dick, could be a test-piece for "The Man in the High Tower." Its future America is Chinese, but the Tinkerists have a technological cult that violates all the celestial society. Lester del Rey's "Unreasonable Facsimile" takes the battle of the sexes to the Moon, with foreseeable consequences. Eric Frank Russell's "Heav'n Heav'n" is an offbeat little story of a baker's apprentice who longed for space.

"Venus Trap," by Robert Silverberg, is interplanetary skulduggery in the mood of today's Retief. M. C. Pease's "Telestassis"—surely misspelt?—anticipates the telepathic crisis of John Brunner's "The Whole Man" (was "Pease" a pseudonym?). Frederik Pohl, in "Wapshot's Demon," crosses Maxwell's Demon with a Hilsch Tube with mildly interesting results. Russell is in again with "The Case for Earth": in the eyes of Galactic civilization there is none. Finally, in "The Outcasts," George H. Smith, introduces an ancient ship from Earth that is the carrier of a virulent disease whose name galactic civilization has forgotten—racism.

The chief virtue of the collection is that the stories *have* been overlooked so long that they won't be familiar.

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MIND SWITCH

By Damon Knight • Berkley Books, New York • No. F-1160 • 144 pp. • 50¢

The crested ape on the cover of this puzzling book is a very poor likeness of Fritz, the Brecht Biped in the Hamburg Zoo, who swaps personalities with a reporter from *Paris-Soir*. The cause is a rather unimportant error by a local experimenter. The result is predictable. The method of describing it is, for Damon Knight, atypical and exasperating.

Fritz, the Biped, is suddenly a reporter. He is intelligent enough to know how to hide in his new body, but lacks the proper tenant's knowledge of everyday living. Martin Naumchick, the journalist, is naturally unable to persuade anyone of his identity—and is, let it be said, framed to stop the bother at the zoo. The details of how they adjust are interesting at the time, but not very. And the Germans sound like a comedy team from an old movie shown on the late late show—not pre-war vaudeville, but still pure stereotype.

Damon, how could you?

Reprints and Reissues

THE REST OF THE ROBOTS

By Isaac Asimov • Pyramid Books, New York • No. R-1283 • 159 pp. • 50¢

This paperback edition contains the short stories from the colossal Doubleday omnibus of the same name, but not the two novels about R. Daneel Olivaw, the robot detective, which belong to other publishers. This is a companion to "I, Robot," the first collection of positronic robot stories.

THE FIRST MEN IN THE MOON

By H. G. Wells • Airmont Publishing Co., New York • No. CL-78 • 160 pp. • 50¢

Another in the deluge of paperback editions of Wells that started when his copyrights expired. These Airmont Classics have special introductions for teen-age readers by Robert A. W. Lowndes, veteran fan and SF bibliographer.

CHILDREN OF THE LENS

By E. E. "Doc" Smith • Pyramid Books, New York • No. X-1294 • 255 pp. • 60¢

Sixth and last of the famous "Lensman" series which may very well win a special award at this year's SF Convention in Cleveland as "Best Series" of all time.

ADVENTURES IN TIME AND SPACE

Edited by R. J. Healy & J. F. McComas • Bantam Books, New York • No. F-3102 • 181 pp. • 50¢

A ridiculous new cover illustra-

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tion that bears no relation whatever to van Vogt's memorable Coeurl (you might call this one Pussyman Galore) decorates a fragment (eight stories, all from the 1938-1943 Astounding) of the early and still great SF anthology. The nearly complete volume is a Modern Library Giant.

BILL, THE GALACTIC HERO

By Harry Harrison • Berkley Books, New York • No. F-1186 • 143 pp. • 50¢

The outrageous antithesis to Heinlein's "Starship Troopers."

THE BEST FROM FANTASY AND SCIENCE FICTION, ELEVENTH SERIES

Edited by Robert P. Mills • Ace Books, New York • No. M-137 • 254 pp. • 45¢

If you enjoy fantasy you should never miss these anthologies. If you enjoy good science fiction you shouldn't either. This is the 1962 collection, featuring Cordwainer Smith's unbelievable "Alpha Ralpha Dickson, Davidson, Simak, Vonne-Boulevard," plus Asimov, Anderson, gut, Finney, Evelyn Smith, and some freshly blooming talents.

NIGHT OF MASKS

By Andre Norton • Ace Books, New York • No. F-365 • 191 pp. • 40¢

Nobody writes better far-world adventure stories. Only an idiot would refuse to read this one because it is a reprint of a hardback published for teen-agers.

THE IMPOSSIBLES

By Mark Phillips • Pyramid Books, New York • No. R-1299 • 157 pp. • 50¢

This should have been in my "Reissues" list: Pyramid had it in '63. It's one of the "Elizabeth Tudor" yarns which bloom here in Analog from time to time—the one in which FBI agent Malone encounters the vanishing kids.

TITANS' DAUGHTER

By James Blish • Berkley Books, New York • No. F-1163 • 142 pp. • 50¢

Different publisher; different Blish. More conventional SF, with genetic giants vs. "normal" humanity.

EARTHLIGHT

By Arthur C. Clarke • Ballantine Books, New York • No. U-2824 • 155 pp. • 50¢

One of Ballantine's "Bal-Hi" series of paperbacks for high schools, with a special introduction for teachers and parents to spell out what the kids can read for themselves: what it will be like to colonize the Moon.

THE PLAYERS OF NULL-A

By A. E. van Vogt • Berkley Books, New York • No. F-1195 • 192 pp. • 50¢

Also published as "The Pawns of Null-A," the publisher notes. It's the sequel to "The World of Null-A," van Vogt's most famous, if not his best, SF from the early Astounding.

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brass tack

Dear Mr. Campbell:

I am writing both to deplore and to commend your December editorial.

You say that the "liberals' excuses" (i.e., ". . . in a ghetto—that such crowding and dirty conditions inescapably breed crime.") is "totally wrong." You then compare the Negro ghetto to the Irish, Chinese, and Jewish ghettos. You conclude that the ghetto condition does not breed crime.

This is fine except that you failed to examine the distinctions between the characteristic condition in the Negro ghetto and the good ghettos —i.e., Irish, Jewish, Chinese, et cetera. In the good ghetto you will find strong cultural unity, strong family structure and the absence of overriding despair. In the Negro ghetto you find a lack of cultural unity, weak to negative family structure, and an overriding sense of despair.

Now cultural unity and strong family structure are the very things that make your group discipline possible. Without cultural background a "different" people is ill-equipped to set up a sub-culture (Chinatown), and with a physical difference (skin color) is unable to integrate with the dominant culture. This leads to despair. Cultural and family ties are absolutely essential if an individual is to develop self-responsibility, self-assurance and a personal sense of well-being. In other words, relatedness is necessary for human well-being.

Now the good ghetto peoples brought with them to this country strong cultural traditions and family structure. Here they were allowed to preserve these. But the Negro came as a slave.

He didn't come with one strong cultural background but with many different and distinct cultures. Members of each specific African culture were dispersed far and wide; consequently, this resulted in the nearly complete breakdown of all African cultures. Additionally, under slavery, Negro family ties and values were nearly completely destroyed, resulting in the breakdown of the American Negro family structure.

This is all to say that there is some

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substance in the liberal argument; but you are right: it is not the crowding, the filth et cetera, but the lack of cultural unity that breeds crime and irresponsibility in the Negro ghetto.

All of this aside, we still must maintain civil order and discipline. The problem is how. Here I commend you. Your proposal that the responsible Negroes try to impose group discipline on the Negro community—in the fashion of the Chinese—is the most practical step towards straightening out this awful social problem that I have yet seen. In doing so, the Negroes would finally be starting to rebuild their culture and family structure, i.e., to make their individual lives relevant.

That any Negroes have escaped the effects of this cultural-family breakdown seems almost impossible; yet a sizable number have. As you say, they should attempt this group self-discipline, for their own benefit; witness the "Elsa Mechanism."

IVAN SUMNER

54 W. Euclid,
Detroit 2, Michigan

The essence of the problem is, I agree, lack of a sense of mutual responsibility and only the Negroes can bring that to Negroes; no other group of people can do it for them.

Dear Mr. Campbell:

The editorial in your February issue was interesting, but I emerged from reading it with the feeling that perhaps you had taken your idea more than a little too far.

I agree somewhat with your contention that modern electronics is the result of a change in thought patterns, but I seriously doubt that the situation is as clear cut as you contend. While sonar and radar development gave some impetus to the use of time rather than frequency domain analysis, it's unreasonable to state that this, and not the development of semiconductor technology, was solely or even largely responsible for the modern emphasis on digital equipment and methods.

I won't become involved in an argument on the merits of solid state vs. vacuum devices in general because that would be similar to arguing the merits of a tractor vs. a sports car—it all depends on what you are going to use it for. The type of device to be used in a given application depends on a number of factors and cannot be generalized. Certainly, newness is not a valid design criteria, but neither is simple age or familiarity. A lot of time and money was spent developing solid state devices, not simply because they were the fad as you suggest, but because they offered the *potential* of extremely low power consumption, small size, high reliability and low cost. This potential has been realized. They also can be made to perform as extremely good switches (much better than vacuum devices in terms of power efficiency and on-off characteristics).

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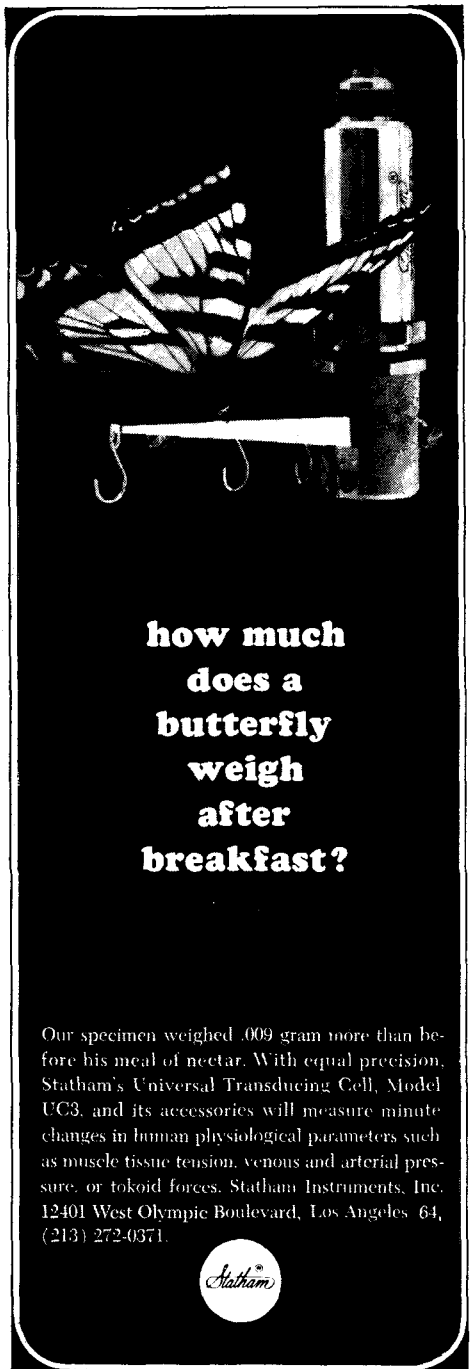
Digital, or pulse, circuitry may have been developed to its present state without solid state devices, but there is no doubt that they have made the process a lot easier and faster by making it possible for engineers to think in terms of a digital solution to practical problems.

True, solid state devices have their limitations (such as temperature sensitivity), but I feel that in an effort to make your point you've painted a picture of them that falls far short of their actual performance and glossed over their very real theoretical and practical advantages in some areas.

To begin with, the temperature sensitivity you complain of is a problem in many applications, but certainly not a "massive" one. What is required is one of those "changes of mental viewpoint" you speak of. Temperature sensitivity *must* be considered in solid state circuit design. The generally used operating range for military semiconductor circuits is −55° C to ±125° C—not a terribly limiting one. I have no doubt that your thyratron temperature control worked well, but so will (and do) properly designed solid state ones. Your statement concerning the equipping of solid-state circuitry with "blowers, heat sinks, refrigeration" et cetera, is a generalization and a gross exaggeration. A number of manufacturers (Smith Corona, Marchant, Victor, Olivetti Underwood) will be glad to sell you


how much
does a
butterfly
weigh
after
breakfast?
Our specimen weighed .009 gram more than before his meal of nectar. With equal precision, Statham's Universal Transducing Cell, Model UC3, and its accessories will measure minute changes in human physiological parameters such as muscle tissue tension, venous and arterial pressure, or tokoid forces. Statham Instruments, Inc. 12401 West Olympic Boulevard, Los Angeles 64, (213) 272-0371.
Statham

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a programmable desk-top computer weighing about fifteen to twenty pounds which operates quite well without the benefit of blowers or refrigeration, over a wider temperature range than you'd wish to use it in (and it doesn't have to be red hot inside either).

Secondly, I doubt that GE's TIMMs (or any other vacuum device that comes to mind) are the size of a transistor—more probably they are about the size of the *case* a single transistor is usually placed in. A typical high-speed switching transistor is about two by three thousandths of an inch in size. There are commercially available integrated solid state arrays with 300 to 500 active devices which are still housed in about the same volume as that of a standard TO-5 transistor can. (An example being a 91 stage-shift register available from General Microelectronics, I believe.)

All solid-state devices *do not* stack up as poorly in terms of frequency response and radiation resistance when compared with tubes as you imply. Conventional bipolar transistors are available with a useful frequency range of over 1,000 megacycles, and, in practice, tunnel diodes are limited in frequency response by the effects of the package they are housed in, in much the same manner as tubes. Majority carrier devices such as the tunnel diode are also highly radiation resistant.

A factor you ignored entirely when discussing solid-state devices was cost. Even "old" alloy junction transistors could be produced in quantity at very low cost relative to tubes in general and especially to special tube types that offered some of the advantages of the transistor. Modern planar transistors are available to the entertainment market for as little as $0.15 to $0.20 in large lots, a price far below any reached by their vacuum tube counterparts *in thirty years of commercial development*. Integrated circuits offer even greater cost reductions by eliminating a large portion of the component and assembly costs.

I would like to emphasize that I am *not* trying to sell solid-state devices any more than you were trying to sell GE's product; they are not a cure-all to every problem, but neither are they a superfluous frill imposed on the electronics community by mass stupidity. Thus, I am at odds with your contention that modern electronics stems from a change in viewpoint only and that "practically everything solid-state devices do could have been done equally well by basic devices known before WW II." The former statement isn't borne out by past experience and the latter is true only in a very narrow sense if practical considerations such as economy of construction and operation, size, and reliability are ignored.

Viewpoints are certainly important in new developments, but no new field stems only from brave new viewpoints. Leonardo da Vinci, who

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had numerous ideas far ahead of his time without any means of bringing them to practical reality, furnishes a case in point. Technological "breakthroughs" arise from a number of interacting factors. The idea of complex, digitally oriented equipment stimulated the development of solid-state devices because they offered the potentiality of being well suited for such devices, and by the same token, the development of good solid-state switches stimulated more thought and effort in the field of complex pulse and digital machines. I don't see how it's possible to separate one from the other and proudly say that here and only here is *the* cause of our advancement.

While you may have no difficulty in picturing a passing interstellar liner making extensive repairs with off-the-shelf hardware, I do. The parallel situation of a modern jet airliner stranded in medieval Europe and attempting to make extensive repairs at the local blacksmith's shop comes to mind. I find it difficult to imagine a "clumsy but workable" jet engine emerging from the proud smithy's anvil. Scientific and technological advances are based on a large cultural backlog of material and require not just new concepts for progress but a means of transforming these ideas into reality.

JAMES BURROUGHS
P.O. Box 8316
University Station
Austin, Texas

A top-notch electronics research friend of mine commented wryly that "solid-state is 'in' this year," when I asked why he'd used solid state methods for something where a tube would be simpler.

My point was that the advances, the time-domain analysis, were not caused by solid-state gadgets, and did not intrinsically need solid-state gadgetry.

As to the jet-airliner stranded in Medieval Europe—the plane's engineer could flange up a workable spark-gap transmitter with the aid of the local blacksmith. And if he could get the local alchemist in on the deal, he'd be able to make a workable JATO unit.

Dear Mr. Campbell:

I have enjoyed Analog for several years. Although I haven't always agreed with your editorials, they have been interesting, stimulating, and logical.

The article "Giant Meteor Impact" in your March, 1966 issue has started me thinking. An article "Tips and Trends," in the November, 1965 issue of *Science Digest*, quotes a Smithsonian Astrophysical Observatory scientist as saying: "An asteroid named Icarus could collide with the earth on June 15, 1968."

I wonder if the author, J. E. Enever, could give a statement re the collision of Icarus with Earth.

TOM VISHER
1514 Belleau Wood
Tallahassee, Florida

. . . A question

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Dear John Campbell:

Thank you for passing on the letter from Tom Visher. Icarus is, of course, only one of a dozen or more asteroids which trespass on the inner solar system. The planets have been vacuum cleaning—or better, fly-swatting—space clean for five billion years. See the face of the Moon and the Mariner IV pictures for proof. But the known dozen must be only a small fraction of the true total number of strays.

We don't know the orbits of these mavericks with the same accuracy which applies to the fixes on the major planets. For example, 6,000 years of observation has enabled us to fix the length of the Martian year to better than six decimal places. We even know the length of the Martian *day* to a split milli-second; it is somewhat as if you found the rate of a good watch by letting it run unaltered for years, checking it daily against the radio time-signal. After a decade you would know the daily loss or gain to a very high degree of accuracy.

We have only been watching the maverick asteroids for half a century or so at most. They are small, and even the long eyes at Palomar and elsewhere lose sight of them: they cannot be checked all the way round their orbits. So we tend to lose them altogether. The stray which wandered closest to Earth was Hermes, in about 1937. Its year is less than that of Mars, and it came within a quarter million miles of Earth—but it hasn't been spotted since the war.

The orbit of Icarus is better known than most. Dr. R. S. Richardson was its co-discoverer. He told about it in an article in *Scientific American* last year—October, I think; sorry not to be more precise, but I don't file this venerable journal, since the wife makes ructions enough about those piles of "Astounding". Richardson's article is worth digging out: the position seems to be that the orbit of Icarus is so sharply inclined to that of Earth as to make it unlikely that any collision will occur in the next few foreseeable megacenturies. This does not argue that there are no asteroids in circulation which can *and therefore inevitably will* eventually collide with the Earth. Operation Fly-swat is not complete.

Mark you, the lack of not merely exact knowledge but even of well-computed guesstimation on the origin of the meteorites is little short of scandalous. When that ten-mile diameter radio telescope is orbited, its first job should be an accurate census of interplanetary and interstellar debris. At present, the Late Lamented Planet V seems to be a good bet for the origin of many meteors. But Earth also possesses a halo of comets extending halfway to the nearer stars which must make some contribution.

Nor may we ignore the lively possibility that rare large bodies may track in with the smaller stuff which

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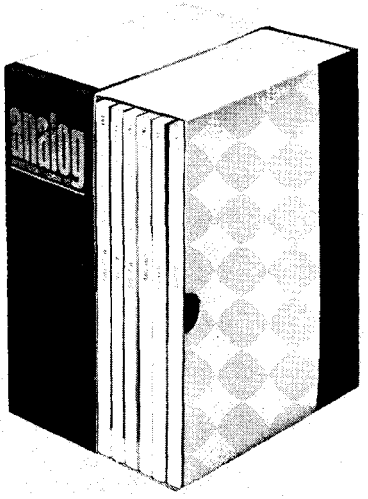

does zip in from the galaxy at large. This may travel at more than 200 km. per second . . .

This sets me wondering. The Tunguska meteorite in 1908 flattened a 60-mile circle of forest, yet caused no substantial crater. Could this have been something other than a thousand tonner hitting the deck at 30 to 40 km. per second? Suppose it were a *hundred* tonner a ball less than 14 feet in diameter, moving ten times as fast. Such a body would carry ten times the punch of the heavier but slower job. Let me see—at over 300 km. per second, the total energy would be well up in the megaton range. Depending on the angle at which it ploughed in, might not such a strike vaporize before it had quite reached the ground? Most of the energy would emerge as plain old ordinary electro-magnetic radiation—in the ultra-violet and X-ray spectrum. . . so far as I can see, the energy transformed into radiation will vary as the *eighth* power of the speed. . . the possibility definitely deserves examination. A nickel iron a mere hundred yards or so across travelling at 300 k.p.s. would carry 10^{28} ergs . . . Cor! ! !

Joe Enever

And some answers.

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Dear Mr. Campbell:
Re: "Drifting Continents" by Dr. Robert S. Dietz in the April Analog.

Near the end of the interesting article Dr. Dietz invokes possible negative evidence in support of the theory discussed. This evidence is concerned with the Moon, Mars, and Venus. Should he not look for positive evidence in the planet Jupiter? It is my understanding that huge drifts of quite organized reflectivity (Great Red Spot, et cetera) take place on the visible surface of Jupiter. These drifts take place in years, not centuries or mega years. Being so huge Jupiter must be relatively much more fluid relative to its own gravity than the minor planets. This is without invoking square vs. cube law concerning internal heat due to radioactivity and all that jazz.

Take the limit: The surface of our best little star Sol, is apparently a panic from an earth-bound geological time point of view. Big things happen in minutes there.

It is probably more important for you to know that the April issue of Analog is an absolute dandy, one of the best ever.

HAROLD HALVERSEN
1919 East West Hy.
Silver Spring, Md.

Under the pressures involved inside the Earth, the materials act as fluids. True, Jupiter's visible surface, and the Sun's are gaseous—but gas is fluid, and the major difference may be time-rate rather than anything else—tar is a liquid.

Dear Sir:

Have just read your editorial in the March edition of Analog on the F.D.A. Greatly appreciated same.

I appreciated quite a bit your description of how something could be tried in the press but, as more people will probably tell and have told you, Krebiozen was adjudged innocent on all counts (see *Time*, Feb. 11). However, Krebiozen is still banned from interstate travel. Being judged innocent on all counts, is this a legal ban? If not, who would a complaint be addressed to? My interest is due to having a member of my family dying of a cancer that could not be surgically removed due to the length of time it had been in her body. I have read of cures of this type of long-term cancer being stopped, confined, and eradicated by Krebiozen.

Again let me express my appreciation of your editorial.

MARK E. OLSEN

Unfortunately, it's legal—the courts can't review a bureaucratic ruling. Judging by past experiences, the F.D.A.'s next move will be to try the case against Krebiozen again, but this time without a jury. The F.D.A. does better when it can get the cases away from jurymen, and before a three-judge panel. The professional tends to be more convinced by another learned professional than is the layman, who prefers judging by results.

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EDITORIAL

continued from page 7

Surveyor came closer to being a true science-fiction style robot than anything we'd launched before; it could accept and carry out over two hundred fifty different commands. Since it was operating at a distance so great commands from Earth were necessarily 1.3+ seconds delayed in transit, control from Earth would have been impossible. Surveyor had to control its own landing.

Now so far as determining the angle of descent was concerned—that was simply a problem in celestial navigation. The problem of measuring the speed of descent wasn't too tough; Doppler radar could handle that fairly well. But the problem of altitude was a very nice one; as of 2:15 a.m. that morning, we did *not* know the radar-reflection characteristics of that area of the Moon's surface. Suppose there was an area of some dusty material that was radar-black—that soaked up radar beams the way a mass of carbon black would soak up a light beam. No reflection—no radar echo—no measure of altitude.

Or suppose there was a fifty-foot depth of something that was quite transparent to radar overlying a layer of solid igneous rock. The altitude over the radar-reflecting surface would be read accurately—which wouldn't do much good for Surveyor, crashing into a solid-but-radar-invisible surface fifty feet above it!

At a time some two seconds short of the calculated time for activating the main retro-engine, the JPL crew gave Surveyor's on-board control system complete control of the landing maneuver. During the next few seconds, naturally, they sweated copiously—but some 2.6 seconds after the rocket should have turned on, Surveyor reported back in clear computerese, "I have reached the predetermined altitude, and have activated my retro-engines for landing. The main solid-fuel retrorocket, and all three vernier engines are thrusting properly."

Now came the tension as to whether that unbalanced, unextended antenna would make Surveyor go into a fatal tip, tumble, or wobble.

The three vernier engines had as a major part of their function correcting for any slight unevenness of thrust of the main solid-fuel engine; apparently Surveyor's on-board control system and inertial guidance mechanisms sensed any imbalance the antenna did produce, and simply so controlled its vernier engines as to cancel it out perfectly.

At 2:17 a.m., Surveyor touched down on the surface of the Moon. It touched down so gently that the special shock-absorbing crushable foot-pads weren't crushed. The computed target touchdown speed was to have been 12 ft./sec.—the actual touchdown speed was 13 ft./sec. The target-area on the Moon's sur-

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face was reached with such accuracy that the discrepancy was measured in feet rather than miles.

Within a few minutes, Surveyor started obeying Goldstone's commands to start about the business of surveying the lunar surface; in every possible respect the machine was behaving with perfect precision. Even the incompletely extended antenna had been jarred sufficiently by the added G-loading as the main retrorocket fired that it extended itself fully!

Unlike any previous television camera probe, Surveyor was designed for a long-continued series of observations; the TV camera was equipped with a complex system of Earth-controlled adjustments. The camera had a zoom lens, which allowed the men at Goldstone to change the focal length at will; the lens could be focused from four feet to infinity, and the lens diaphragm could be opened or closed down by command from Earth. Moreover, the camera itself could be swiveled through 360°, while the mirror by which it looked around could be controlled to allow it to look at the zenith, or down at its own feet. The camera could, in addition, be switched to a 200-line scan or to a 600-line scan. The 200-line scan allowed transmission of picture signals with lower power—the mode used immediately after Surveyor landed, before it had had time to erect its "sunflower"—the spread of solar cells would gather enough power to charge its batteries.

Every single function of Surveyor I performed to perfection. Every single mechanism and circuit did precisely what the engineers had planned that they should do if everything went well.

The first picture Surveyor sent was one of the most crucial of the whole series—the one picture which would, even if it had been the only picture Surveyor had ever sent, have been a full pay-off on the entire project. It was simply a picture of Surveyor's own foot-pad sitting firmly on the surface of the Moon. *On*, not *in*. That one piece of information was worth millions to the whole space program. Surveyor's "flotation loading" in terms of pounds per square foot of supporting pad, was designed to equal the planned flotation loading of the LEM—the manned Lunar Excursion Module. In almost every respect, Surveyor was designed to be a model, unmanned equivalent of the LEM.

Since that first photograph from the surface of the Moon, Surveyor has been sending them at a rate of a couple hundred every night.

Goldstone's tracking facility is the only station adequately equipped to command and receive information from Surveyor; therefore Surveyor is busily working during the hours that the Moon is above the horizon as seen from Goldstone, but is quiescent during the rest of each Terra-Lunar day. (Which is not quite the

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same length as the solar day, due to the Moon's orbital motion around Earth.)

Surveyor was landed on the Moon in an area that was in the "early-morning" phase of the lunar day—the result is that there will be some twelve days of sunlight in Surveyor's environment before the night-phase settles in. They have already got hundreds of pictures of the surface appearance around Surveyor, under the long, slanting rays of early morning sunlight. During the hours Goldstone can't contact Surveyor, sunlight is busily charging the storage cells on board Surveyor. (Presumably they're nickel-cadmium storage cells; the Ni-Cd cells can endure more heat than almost any other type, and can stand more cycles of charge-discharge than any other type of sealable cell.) Surveyor has a main bank of storage cells and an auxiliary battery—whether the auxiliary battery was a rechargeable type, or a high-intensity primary cell type, isn't stated as yet.

By local noon, the sunlight temperatures are going to be too high for operation of the electronic equipment; most of the silicon semiconductor devices—transistors, diodes, field-effect transistors, voltage-variable capacitors, et cetera—can be operated at temperatures up to about 155°C.

The Texas Instrument Co. makes a series of transistors (and presumably other silicon semiconductors to match) with a "storage temperature" rating of −195 to +300°C.

What this means is that a semiconductor device may be able to stand up to 300°C. provided it isn't, at the same time, being made to control an electric current—i.e., it can't *operate* at 300°C., but can survive in operable condition.

The temperature on the surface of the Moon at local noon runs to about 250-275°C.; the high-temperature silicon semiconductors can't be used while they're being baked at that temperature, but after noon-local, the temperature will begin to fall off as the Sun's rays begin to slant more. As the temperatures get down, the electronic equipment can be put to work again.

Then the entire series of pictures taken by the long, slanting rays of the morning sun can be repeated with the slanting afternoon illumination, making possible a far greater amount of data and understanding of the objects pictured.

One thing I'm extremely curious about, however; the Ni-Cd cells can stand more heat than any other type of sealable storage cell—but they *do* use a water-solution electrolyte, and if the batteries get up to some 250° C. it'll take some fancy pressurization to keep the electrolyte from baking out! I know they've done some slightly miraculous things in the way of cryogenic storage systems that are so well insulated that a 20-liter liquid helium flask can be used to store the liquefied

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stuff at 4°A. for a week or so. Maybe they can keep a battery bank in a sort of cryogenic insulated tank that's insulated well enough to keep it from boiling over during a several-days exposure to the unshielded noon sun on the Moon. But it'll be a good trick!

However—Surveyor paid off with the very first photograph it sent back. (And for a long-time science-fictioneer, those shots appearing on the TV set screen with the label "Live . . . from the surface of the Moon" were a kind of pay-off too! And the shots of the JPL lab control center, and of the Goldstone Tracking equipment were obviously movie sets made up from our April 1946 cover for George O. Smith's "Pattern for Conquest"!)

The absolute and total success of Surveyor seems to me to have been about equivalent in probability to the poker player who successfully draws to an inside open in a royal straight flush.

The United States can well claim to have done a magnificent job of designing and constructing some highly sophisticated and astonishingly competent space equipment. And it's obviously true that luck doesn't happen to people who don't do a lot of hard work preparing for it to happen.

But . . . well, let's be reasonably honest.

Surveyor I's incredible success *was* a Royal Straight Flush sort of hand. We were lucky beyond any rational prediction.

Coming as it did right smack in the middle of the most thoroughly lucked-out space mission we've attempted—the repeated Gemini 9 breakdowns—we really can't claim to be quite as good as Surveyor I would seem to indicate.

And I can't help having a certain amount of wry sympathy for the unfortunate, hard-luck cases in the Russian Space Agency in charge of their soft-landing Lunar probes. Their Lunas #1, 2, 3, et cetera, were duds. They finally did make the first soft-landing on the Moon, had the British steal some of their thunder by releasing the Russian moon-probe pictures before they did, and got nine critically important pictures from the lunar surface before their gadget quit.

There's no argument; the Russians were first to get photographs from the Moon's surface.

But—the first-try absolute success of Surveyor I is a little hard to take. And that it isn't a basketball size gadget that "soft" landed at a couple hundred kilometers per hour, but an immense, complex, highly responsive robot that could have landed a cargo of eggs without cracking a shell, and that it's sent hundreds of magnificent photographs, scanning in all directions on command—well, if you were one of the Russian engineers, wouldn't you feel Lady Luck was anything but a lady? ■ *The Editor.*

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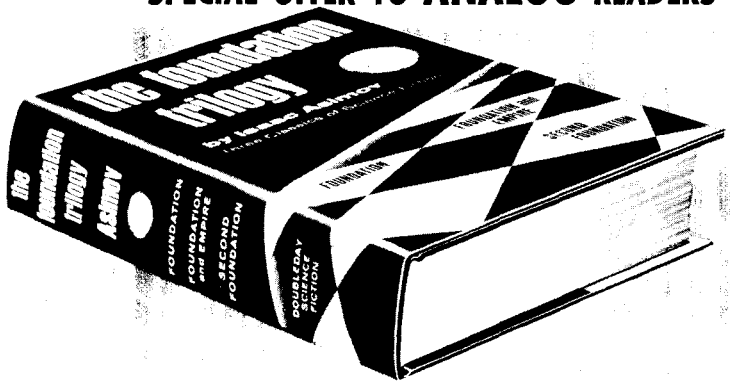

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